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CANTON DROP FORGE
Information for Bidders
Proposal, Contract & Specifications
for
INDUSTRIAL PRETREATMENT *system*

Contract No. 95-1: General Construction - Design/Build

Prepared for:


William K. Cordier, Chairman
Canton Drop Forge
4575 Southway Street, S.W.
P.O. Box 6902
Canton, Ohio 44706

Prepared by:

Hammontree & Associates, Limited
Engineers • Planners • Surveyors
5233 Stoneham Road
North Canton, Ohio 44720
(216) 499-8817

DESCRIPTION OF WORK

Contractor is to design, construct, purchase and install the Industrial Pretreatment System to include:

- (1) 120 gpm oil/water separation yard as more fully described in paragraph 4.1 of the Oil/Water Separation Design Report dated October, 1994 (the "Report")
- (2) horizontal cyclone steam/oil separator - 120,000 lbs./hr. to achieve 98% efficiency as more fully described in paragraph 2.4(a) of the Report; and
SEP 1994 HPS
- (3) oil/water separator to process condensate from the boiler house sump pump and liquid discharge from item 2 above as more fully described in paragraph 4.2(b) of the Report. 

All of the above to achieve a maximum discharge of less than 10 parts per million from the Industrial Pretreatment System.

DESCRIPTION OF WORK

Contractor is to design, construct, purchase and install the Industrial Pretreatment System to include:

- (1) 120 gpm oil/water separation yard as more fully described in paragraph 4.1 of the Oil/Water Separation Design Report dated October, 1994 (the "Report")
- (2) horizontal cyclone ^{*oil/steam*} ~~steam/oil~~ separator - 120,000 lbs./hr. to achieve 98% efficiency as more fully described in paragraph 2.4(a) of the Report; and
- (3) oil/water separator to process condensate from the boiler house sump pump, and liquid discharge from item 2 above as more fully described in paragraph 4.2(b) of the Report.

All of the above to achieve a maximum discharge of less than 10 parts per million from the Industrial Pretreatment System.

*liquid discharge from a separator
situated just prior to
hot process water softener,*

Warranty - greater of one year
or mfg warranty. and
assign all mfg warran
to CDF

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INDUSTRIAL PRETREATMENT SYSTEM CANTON DROP FORGE

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**INVITATION & INFORMATION
FOR BIDDERS**

INVITATION FOR BIDS

Sealed proposals addressed to Canton Drop Forge will be received at their offices at 4575 Southway Street S.W. Canton, Ohio, 44706 until 12:00 P.M., local time, on the _____ day of _____, 1995, for furnishing all engineering, labor, materials and equipment necessary to complete the project known as the INDUSTRIAL PRETREATMENT SYSTEM. All bids will be publicly opened and read aloud immediately after opening.

Contract Documents, bid sheets, plans and specifications can be obtained at the office of Canton Drop Forge. Copies may be obtained upon payment of a nonrefundable fee of \$25.00 for each set of documents. Checks shall be made payable to Canton Drop Forge. Copies of plans and specifications may be mailed for an additional \$5.00. Mail check for \$30.00 to Canton Drop Forge P.O. Box 6902 Canton, Ohio, 44706 Attention: Keith Houseknecht. ~~Specifications will also be on file in the plan room of the F. W. Dodge Corporation and Canton BIA.~~

Work will consist of designing and installing two oil/water separator systems complete with the necessary appurtenances in accordance with the contract documents and design report dated October 1994. **INSERT A**

All bids must be submitted on the Bid Forms available with the specifications. Bid envelopes must be sealed and plainly marked:

BID - INDUSTRIAL PRETREATMENT - CANTON DROP FORGE

Bidders must submit two (2) copies of the completed bid forms.

Each bidder is required to furnish with its proposal, a Bid Guaranty Bond in accordance with Section 153.54(B) of the Ohio Revised Code or bidders must submit a certified check in the amount of ten (10) percent of bid to guarantee that if the bid is accepted, a contract will be entered into and properly executed. Bid security furnished in Bond form, shall be issued by a Surety Company or Corporation licensed in the State of Ohio to provide said surety.

Each proposal must contain the full name of the party or parties submitting the proposal and all persons interested therein. Each bidder must submit evidence of its experiences on projects of similar size and complexity. The owner intends and requires that this project be completed no later than November 1, 1995.

~~All contractors and subcontractors involved with the project will, to the extent practicable, use Ohio products, materials, services, and labor in the implementation of their project. Additionally, contractor compliance with the equal employment opportunity requirements of the Ohio Administrative Code Chapter 123, the Governor's Executive Order of 1972, and Governor's Executive Order 84-9 shall be required.~~

Work shall be completed within one hundred eighty (180) calendar days after the date of Notice to Proceed from Canton Drop Forge, weather permitting. The estimated construction cost as of October 1994 is \$200,000.00. A pre-bid conference will be held at Canton Drop Forge on APRIL 24 21 1995, at 10:00 A.M.

All bids will be opened and read at 12:00 Noon on MAY 1, 1995 at the Offices of Canton Drop Forge.

Canton Drop Forge reserves the right to reject any or all bids, and to waive any informalities or irregularities in the bids received.

Dated: _____, 1995

William K. Gordier
Chairman

INFORMATION AND INSTRUCTIONS TO BIDDERS

PROJECT LOCATION AND SCOPE OF WORK

The project is located at the Canton Drop Forge ("CDF") Facility at 4575 Southway Street S.W. Canton, Ohio, 44706. The project includes the design and construction of two oil/water separation systems as described in the Design Report. *INSERT A.*

ADVERTISEMENT AND BID OPENING

The bidder's attention is called to certain requirements in the advertisement for bids, relative to the submission of bids for the work herein specified. Any bid received after the time and date specified shall not be considered. After all bids are opened and read, the Engineer will tabulate, evaluate, and prepare a written recommendation to CDF, after which an award will be made.

CONDITION OF WORK

Bidders are advised to carefully examine the contract documents and design report for the proposed work. The contract documents indicate the work to be done, ~~insofar as has been determined~~. However, the bidders are expected to examine the site and to judge for themselves all circumstances affecting the cost of the work and the time required for its completion.

Each bidder must inform himself fully of the conditions relating to construction and labor under which the work will be performed. Failure to do so will not relieve a successful bidder of his obligation to furnish all services, materials, equipment and labor necessary to carry out the provisions of the contract documents and to complete the contemplated work for the consideration set forth in his bid. Contractor shall carry out his work employing such methods or means so as to limit the interruption, interference and inconvenience to pedestrians and vehicles in the project area. *and production*

The Contractor shall keep himself fully informed and shall comply with all existing and future laws, ordinances and regulations of the Federal, State, County and Municipal Governments, in any manner affecting his employees, or the conduct of the work, or the materials used or employed in the work.

TIME OF COMPLETION

Work shall commence within ten (10) days from the date of Notice to Proceed from CDF. Work shall be completed within one hundred eighty (180) calendar days from the date of Notice to Proceed from CDF.

EXAMINATION OF SITE

The bidder's attention is directed to the necessity of examining the site of the proposed work. Before submitting a proposal, bidders shall inform themselves fully of the conditions relating to construction and labor under which the work will be performed. The bidders will have an opportunity to visit the site after the pre-bid meeting or by appointment with Keith Houseknecht at CDF (216)477-4511.

PREPARATION OF PROPOSALS

Bids shall be ~~in conformity with the Ohio Revised Code and must be~~ submitted on the prescribed forms in these documents. All blank spaces must be filled in by typewriter or ink. All bids must be submitted in sealed envelopes bearing on the outside the name of the bidder, his address and the name of the project for which the bid is submitted.

RIGHT TO ACCEPT OR REJECT PROPOSALS

CDF reserves the right to reject any or all proposals, or parts thereof, to waive any informalities or irregularities in the proposals received and to accept any proposal which is deemed to be in their best interest.

AWARD

to the lowest responsible bidder ~~based on the~~
Award will be made *the industrial pretreatment* based on the total design/build price for ~~both oil/water separator~~ systems complete.

ESTIMATED QUANTITIES

The estimated unit quantities listed on the proposal and bid form are to be considered approximate and are to be used only for the comparison of bids. Payments, except for lump sum items, will be made to the Contractor for actual construction quantities of work performed or materials furnished.

CDF reserves the right to increase, decrease or omit any item that it may deem advisable.

ADDENDA AND INTERPRETATIONS

If any person who contemplates the submission of a proposal is in doubt as to the true meaning of any part of the plans, specifications or contract documents, he shall request an interpretation from the Engineer in writing prior to the date set for receiving proposals.

In the event of any error, omission or discrepancy in the plans, specifications and contract documents, the bidder shall request in writing an interpretation in advance of the taking of bids. Failing to do so, the Contractor must accept the ruling of the Engineer as to the correct intent.

Any and all such interpretations and any supplemental instructions will be in the form of written addenda to the specifications. Prior to the date fixed for receiving of proposals, all parties of record as having taken out a set of contract documents will receive a copy of the addendum or interpretation. Failure of any bidder to receive any addendum or interpretation shall not relieve the bidder from any obligation under his bid as submitted. All addenda so issued shall become a part of the contract documents and must be attached to each proposal.

DEFAULTER

No contract will be awarded to any bidder who is in arrears to CDF upon debt or contract, or who is a defaulter as surety or likewise upon any obligation to CDF.

BID SECURITY

Each bid shall be accompanied by a certified or cashier's check in the sum of ten percent (10%) of the total amount bid together with a consent of surety for total amount bid or a bid guaranty in the amount of one hundred percent (100%) of the bid.

Bid check must be drawn on a solvent bank and made payable to CDF.

Certified or cashier's check or bid bond shall be held as a guarantee that in the event the bid is accepted and a contract awarded to the bidder, the contract will be duly executed and its performance properly secured. Should the successful bidder fail or refuse to execute the contract, within ten (10) days after receipt of notification of award, said check and the amount represented thereby, will be forfeited to CDF as liquidated damages. The surety on any bond shall be liable to CDF in an amount ~~not to exceed~~ ^{equal} ten percent (10%) of the bid. All bid guarantees shall be conditioned that if the bid is accepted within sixty (60) days of the bid opening, a proper contract shall be executed.

DISPOSITION OF BID SECURITY

After the receipt of bids, the lowest ~~and best~~ bidder will be determined. The bond or check of all except the lowest three bidders will be returned within 48 hours after award of the contract or rejection of all bids, but in any case, not more than sixty (60) days following the opening of bids. The remaining deposits will be returned as soon as a contract is executed and secured. In case the lowest and best bidder shall fail to execute and secure a contract within ten (10) days, the award may be vacated and deposit forfeited as liquidated damages, and the contract awarded to the next lowest responsible bidder who shall thereupon execute the contract and furnish the required

bond or security for the performance of the contract within ten (10) days or forfeit his deposit as liquidated damages.

PERFORMANCE BOND

The successful bidder will be required to furnish a bond for the faithful performance of the contract of a sum not less than one hundred percent (100%) of the total price bid for the completed work, said bond to be that of an approved surety company, to the satisfaction of CDF.

Agents of bonding companies which write bonds for the performance of the contract shall furnish power of attorney, bearing the seal of the company, evidencing such agent's authority to execute the particular type of bond to be furnished, and evidencing also the right of the surety company to do business in the State of Ohio. Copy of this proof shall be attached to each copy of the contract.

The successful bidders have the obligation of meeting the following specifications for such bond:

The Attorney in fact signature on the Performance Bonds must be an original signature;

No time limit for the instituting of suit under the bond is to be mentioned in the bond;

Canton Drop Forge is the Obligee on the bond;

Date of Contract and purpose of Contract must be listed on the bond;

A Power of Attorney form (which form authorizes and appoints the Attorney-in-Fact) shall accompany the bond;

Any Notary Public, Certificate or Witnesses signature must be original signatures;

The amount of the Performance Bond, or a sum in excess of that amount, must appear on the Power of Attorney form, to show that this is the amount for which the Attorney-in-Fact is authorized to sign the bond. The bond shall be purchased through a surety company with a local agent upon whom service of process can be made.

In event of failure of surety or co-surety, the Contractor shall immediately furnish a new bond, as required herein. The Contractor's bond will not be released until all provisions of the contract have been fulfilled.

ONE-YEAR MAINTENANCE BOND

Contractor shall furnish to the Owner, upon completion of the work, a one-year Maintenance bond in the amount of the contract, for maintenance of or correction of deficiencies in the contractor's work. Contractor shall guarantee his work for the period of one year following completion of construction and acceptance of the project by the Owner.

LIABILITY INSURANCE

The Contractor shall carry comprehensive general liability and comprehensive automobile liability insurance in the minimum amount as stated in the attached specifications.

Should any part of the work covered by this contract involving work at the site of the project be sublet, the Contractor shall furnish satisfactory proof of insurance of the character and in the amounts deemed necessary and required by CDF to provide insurance protection which in the aggregate will be equal to that specified for the principal Contractor if no work were sublet, such insurance to be written in the name of the subcontractor to cover work to be performed by him and his employees.

The Contractor shall furnish CDF with satisfactory proof of carriage of the insurance required, and neither he nor any sub-contractor shall commence work until such proofs have been submitted and the insurance approved by CDF.

WORKMEN'S COMPENSATION

The Contractor shall submit to CDF, prior to commencing work, a copy of his Workmen's Compensation certificates from the Industrial Commission of Ohio.

SIGNATURE OF BIDDERS

The firm, corporate, or individual name of the bidder must be signed by the bidder in the space provided for the signatures on the proposal blank. In the case of a corporation, the title of the officer signing must be stated and such officer must be thereunto duly authorized. In a case of partnership, the signature of at least one of the partners must follow the firm name, using the term "doing business as _____", or "Sole Owner". The bidder shall further state in his proposal the name and address of each person or corporation to which he proposes to sublet any portion of the work.

PERMITS

after approval in writing from CDF,

The Contractor shall take out all necessary permits from the state, county or other public authorities, and shall give all notices required by law as directed by CDF.

The Contractor shall not contact state, county or other public authorities without written approval from CDF.

EXECUTION OF CONTRACT

The bidder to whom the contract may be awarded will be required to execute a written contract with approved sureties within ten (10) days from the date of the Notice of Award from CDF. In case he shall fail to do so, the bid security accompanying his proposal may thereupon be forfeited to and the amount thereof retained by CDF as liquidated damages for any expense or delay which may be incurred in making another letting for the performance of said work, and to indemnify said CDF for any loss which it may sustain by failure of the bidder to execute the contract and furnish bond as aforesaid, and the work may be readvertised or let to the next higher or next best bidder, as CDF may determine.

TIME OF CONTRACT AWARD AND EXECUTION

Proposal for the performance of the work covered by this contract may be held by CDF for a period of sixty (60) days after the receipt of proposals and shall continue in full effect during that period and shall not be subject to withdrawal.

If no contract shall have been awarded within sixty (60) days from the receipt of proposals, any proposal may be withdrawn or nullified by the party or parties submitting the same, but in the absence of such action shall be deemed to be confirmed and extended in time and for as long as permitted by the proposers thereof.

LIQUIDATED DAMAGES

Canton Drop Forge will suffer additional costs if the project is not substantially completed within the time specified. As a condition to the acceptance of the contract, Contractor and his surety shall be liable for and pay CDF liquidated damages in the amount of One hundred dollars (\$100.00) for each calendar day the project remains in an unfinished condition beyond the time of the of completion set forth in these instructions to bidders. Such amount may be deducted by CDF from any payment due the Contractor. Nothing under this section shall prohibit CDF from recovery of damages for delay under other provisions of the contract documents.

The amount of liquidated damages is fixed because it is impractical and extremely difficult to determine and fix the actual additional costs CDF would in such event sustain, and said amount is agreed to be the amount of damages which CDF would sustain and shall not be treated as retainage.

Where additional time is allowed for the completing of any work, the new time fixed by such extension shall control. The Contractor shall not be charged with liquidated damages when CDF determines the Contractor is without fault and the Contractor's reasons for the time extension are acceptable to CDF.

BIDDER'S AFFIDAVIT

Each bidder who is a foreign corporation, that is, a corporation not chartered in Ohio but licensed to do business in Ohio, is required to submit with his bid an affidavit duly executed by the President or General Manager of the corporation, stating in said affidavit that said foreign corporation has, in accordance with the provisions of the ~~General Code of the State of Ohio~~ ^{Ohio}, obtained a certificate authorizing it to do business in the State of Ohio. (These certificated or certified copies of them are obtainable from the Tax Commission of Ohio at Columbus).

Revised

WITHDRAWAL OF PROPOSAL

Bids may be withdrawn at any ^{time} ~~item~~ prior to the time for opening. No bidder may withdraw his bid for a period of sixty (60) days after the opening of bids.

COMPETENCY OF BIDDER

No bid will be considered unless the bidder shall have furnished evidence satisfactory to CDF that he has the necessary facilities, ability and financial resources to fulfill the conditions of the contract.

ASSIGNMENT

Assignment of this contract, or any part thereof or any funds to be received thereunder by the Contractor, will be subject to the approval of CDF. Any such assignment shall contain a clause to the effect that it is agreed that the funds to be paid the assignee under the assignment are subject to a prior lien in favor of all persons, firms, or corporations rendering services or supplying materials for the performance of the work called for in said contract.

NONCOLLUSION AFFIDAVIT

All bidders will be required to submit a noncollusion affidavit, in the form included in the contract documents. This affidavit shall be dated and executed before the opening of bids.

LAWS AND ORDINANCES

The attention of bidders is called to the laws of Ohio and the Stark County regulations relative to the employment of laborers and the necessity of being thoroughly informed in relation thereto.

The U.S. Department of Labor "Safety and Health Regulations for Construction" identified as Chapter XVII of Title 29, Code of Federal Regulations (CFR), Part 1926 (formerly Part 1518) and subsequent amendments are hereby made a part of these specifications.

WORKING HOURS:

WORKING HOURS

Work on the project shall take place from Monday through Friday between the hours of 7:00 am and 5:00 pm. No work shall be permitted on Saturdays, Sundays or Holidays unless prior written permission is obtained from CDF.

CONFLICT IN MEANING

The Supplemental General Conditions shall supplement and/or modify the General Conditions included herein and shall govern whenever there is a conflict in meaning.

PRECONSTRUCTION MEETING

There will be a preconstruction meeting and the successful bidder is required to schedule and attend.

UNIT PRICES

The unit prices specified in the unit price column will govern the award of the contract. The bidder shall make the calculations in the amount bid column and also add up the total. However, the unit price specified, together with the estimated quantities, shall determine the total amount of the bid. If there is an error made in the extensions by the bidder, the total shall be changed as only the unit prices shall govern. Unit prices shall be used to determine differences or changes between estimated quantities and actual construction quantities.

BID AND CONTRACT

FORMS

CANTON DROP FORGE
Stark County, Ohio
Proposal for
INDUSTRIAL PRETREATMENT *SYSTEM*
Contract 95-1

- NOTE 1: THE SIGNING OF THE BID REPRESENTS THE BIDDER'S ACCEPTANCE OF THE TERMS AND CONDITIONS OF THE INSTRUCTIONS TO BIDDERS AND THE SPECIFICATIONS AND PROVISIONS AND THAT THE BIDDER WILL ENTER INTO THE CONTRACT IF HE IS AWARDED THE BID AND WILL ENTER SAID CONTRACT WITHIN TEN (10) DAYS OF NOTICE OF AWARD. BID IS TO BE FIRM AND MAY NOT BE WITHDRAWN FOR A PERIOD OF SIXTY (60) CALENDAR DAYS.
- NOTE 2: THE BIDDER AGREES THAT CANTON DROP FORGE HAS THE RIGHT TO REJECT ANY OR ALL BIDS AND TO WAIVE INFORMALITY IN ANY BID AND THAT THE BIDDER SHALL NOT DISPUTE THE CORRECTNESS OF THE METHODS USED IN COMPUTING THE LOWEST RESPONSIBLE BIDDER.
- NOTE 3: ALL COSTS OF MAINTENANCE WORK DURING CONSTRUCTION AND BEFORE THE FINAL ACCEPTANCE IS MADE SHALL BE INCLUDED IN THE LUMP SUM PRICES BID ON THE VARIOUS BID ITEMS AND THE CONTRACTOR WILL NOT BE PAID AN ADDITIONAL AMOUNT FOR SUCH WORK.

TO: CANTON DROP FORGE
4575 SOUTHWAY STREET S.W.
P.O. BOX 44706
CANTON, OHIO 44706

FROM: _____
FIRM NAME

ADDRESS

TELEPHONE NO. _____

**Canton Drop Forge
Industrial Pretreatment**

April 1995

Item No	Item	Est'd Quantity	Unit	Separate Unit Prices (figures)		Combined Unit Prices (to be written in words)	Quantity Times Unit Total
				Mat'L	Labor	Mat'l-Labor-Unit-Total	Amount
4.1	120 gpm oil/water separation yard system - complete	Lump Sum	1				
4.2a	98% efficient horizontal cyclone steam/oil separator - 120,000 lbs/hr - complete	Lump Sum	1				
4.2b	Condensate oil/water separator w/boiler house sump pump revisions - complete	Lump Sum	1				
	Design Services	Lump Sum					

CD F005463

TOTAL AMOUNT OF BID

_____ (\$ _____)
(Written Out)

The Contractor agrees to complete all of the work specified ~~for this contract~~ ^{here in} within one hundred eighty (180) calendar days after the date of Notice to Proceed. The contractor further agrees to pay as liquidated damages, the sum of \$500.00 for each consecutive calendar day thereafter as provided in the information and Instructions to Bidders. The bid prices shall include all labor, materials, equipment, overhead, profit, insurance, etc., to cover the finished work.

Bidder understands that Canton Drop Forge (CDF) reserves the right to reject any or all bids and waive any informalities in the bidding. The bidder agrees that this bid shall be good any may not be withdrawn for a period of 60 calendar days after the scheduled closing time for receiving bids.

Upon receipt of Notice of Award by CDF, bidder will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required. The bid security attached in the form of _____ in the sum of _____ (\$ _____) is to become the property of CDF in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to CDF caused thereby.

BIDDER acknowledges receipt of the following ADDENDUM:

Addendum No. _____, Dated _____

Addendum No. _____, Dated _____

Addendum No. _____, Dated _____

Addendum No. _____, Dated _____

EXPERIENCE AND EQUIPMENT QUESTIONNAIRE

The signatory of this proposal guarantees the truth and accuracy of all statements and of all answers to interrogatories hereinafter made.

1. How many years have you been in business as a General Contractor under you present business name?
2. How many years have you been in principal officer of a general contracting firm under another name?
3. What projects of a similar nature has your organization completed?

(Note: Fill out each blank completely)

Name of Owner and Location	Name and Address of Person in Responsible Charge as Reference	Class of Work	Amount of Contract	Date of Completion

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-15-
HAMMONTREE & ASSOCIATES, LIMITED

CDF005465

EXPERIENCE AND EQUIPMENT QUESTIONNAIRE

Have you, or your Company, or any organization of which you have been a responsible officer or agent, ever failed to complete any work awarded to you? If so, where and why?

The work awarded or to be awarded will have the personal supervision of whom?

Explain approximately your plan and layout for performing the proposed work.

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HAMMONTREE & ASSOCIATES, LIMITED

CDF005466

EXPERIENCE AND EQUIPMENT QUESTIONNAIRE

7. What equipment do you own that is available for the proposed work?

Quantity	Description Size, Capacity, Etc.	Condition	Years of Service

8. At what places are the principal items of the equipment located?

CANTON DROP FORGE
Stark County, Ohio
Proposal for
INDUSTRIAL PRETREATMENT *SYSTEM*
Contract No. 95-1

CANTON DROP FORGE RESERVES THE RIGHT TO ACCEPT OR REJECT ANY AND ALL BIDS.
THE BID WILL BE AWARDED TO THE LOWEST RESPONSIBLE BIDDER.

BID IS FIRM FOR SIXTY (60) DAYS.

ATTACHMENTS: BID GUARANTY BOND OR CONSENT OF SURETY FORM.
NON-COLLUSION AFFIDAVIT

SIGNATURE CLAUSE:

IF A CORPORATION

NAME OF CORPORATION

SIGNATURE: _____
PRESIDENT

SIGNATURE: _____
SECRETARY

IF A PARTNERSHIP:
(List All Partners)

NAME OF PARTNERSHIP

SIGNATURE: _____

SIGNATURE: _____

SIGNATURE: _____

IF AN INDIVIDUAL DOING BUSINESS
UNDER THE FIRM NAME AND STYLE OF: _____

State of Ohio
County of _____

SIGNATURE: _____

SWORN TO AND SUBSCRIBED BEFORE ME THIS _____ DAY OF _____, 19____.

NOTARY PUBLIC

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BID GUARANTY FORM 1
BID GUARANTY BOND

(Not to be filled out if a certified check is submitted)

KNOW ALL MEN BY THESE PRESENTS:

That we, the undersigned _____
(Name and Address of Contractor)

as Principal, hereinafter called Principal, and _____

(Name and Full Mailing Address of Surety)

as Surety, hereinafter called Surety, are hereby held and firmly bound unto Canton Drop Forge, as Oblige in the penal sum of the dollar amount of the bid submitted by the Principal to the Oblige on the _____ day of _____, 19____, to undertake the project known as the INDUSTRIAL PRETREATMENT SYSTEM. The penal sum referred to herein shall be the dollar amount of the Principal's bid to the Oblige, incorporating any additive or deductive alternate proposals made by the Principal on the date referred to above to the Oblige, which are accepted by the Oblige. In no case shall the penal sum exceed the amount of one hundred (100) percent of the bid including any alternates which may be accepted. For the payment of the penal sum, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal has submitted a bid for the project.

NOW, THEREFORE, if the Oblige accepts the bid of the Principal and the Principal fails to enter into a proper contract in accordance with the bid, plans, details, specifications, and bills of material; and in the event the Principal pays to the Oblige the difference not to exceed ten (10) percent of the penalty hereof between the amount specified in the bid and such larger amount for which the Oblige may in good faith contract with the next lowest bidder to perform the work covered by the bid; or in the event the Oblige does not award the contract to the next lowest bidder and resubmits the project for bidding, the Principal pays to the Oblige the difference not to exceed ten (10) percent of the penalty hereof between the amount specified in the bid, or the costs, in connection with the resubmission, of printing new contract documents, required advertising, and printing and mailing notices to prospective bidders, whichever is less, then this obligation shall be null and void, otherwise to remain in full force and effect; if the Oblige accepts the bid of the Principal and the Principal within fifteen days after the awarding of the contract enters into a proper contract in accordance with the bid, plans, details, specifications, and bills of material, which said contract is made a part of this bond the same as though set forth herein:

NOW ALSO, if the said Principal shall well and faithfully do and perform the things agreed by the Principal to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the Oblige herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

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BID GUARANTY BOND

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The said Surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of the said contract or in or to the plans or specifications therefore shall in any way affect the obligations of said Surety on its bond.

Signed this _____ day of _____ 19__.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

PRINCIPAL: _____

By _____

Witness of Principal

Title: _____

SURETY: _____

By _____

Witness of Attorney-in-Fact

Attorney-in-Fact

(Full Mailing Address)

(Facsimile signatures are not acceptable)

(This Bond may be photocopied but not retyped)

BID GUARANTY FORM 2
CONSENT OF SURETY

(To be completed only if certified check or cashier's check is used)

(Name of Surety Company)

(Address)

KNOW ALL THESE MEN BY THESE PRESENTS, that we _____
(Name of Bidder)
as Principal and _____, a corporation created and existing
(Name of Surety Company)
under the Laws of the State of _____, and having its principal office at

_____ are held firmly bound unto the
(Complete Address of Surety Company)
Village of Doylestown hereby jointly and severally and binding our heirs, successors, administrators,
executors, legal representatives and assigns by these presents.

THE CONDITIONS OF THIS OBLIGATION are such that whereas the above named Principal submits
the herewith proposal for construction of the INDUSTRIAL PRETREATMENT, CANTON DROP FORGE
in conformance with the Information and Instructions to Bidders, we the above named Surety, will meet
all the stipulations and will execute the Surety Bond as hereinafter, to the above named Principal in
event he should be awarded a contract and in amount one hundred percent (100%) of the total bid price
for performing the work and guaranteeing its performance in conformity with the plans and specifications
to Canton Drop Forge.

WITNESS OUR SIGNATURES, this _____ day of _____ 19____.

ATTEST:

Witness

(Contractor - Principal)

Signature

Seal

ATTEST:

Witness

(Title)

(Name of Surety Company)

(Signature)

NONCOLLUSION AFFIDAVIT

This affidavit is to be filled out and executed by the bidder. If the bid is made by a corporation, then by its properly authorized agent.

The name of the individual swearing to the affidavit should always appear on the line marked "Name of Affiant". The affiant should sign his/her name at end, not a partnership nor corporation name, and swear to said affidavit before a Notary Public, who must attach his seal.

STATE OF OHIO, COUNTY OF _____, SS.

INDUSTRIAL PRETREATMENT, CANTON DROP FORGE

_____ being duly sworn, deposes and says that he is
(Name of Affiant)

_____ of
(sole owner, partner, president, secretary, etc.)

_____ residing

_____ and that

_____ (person, firms, corporations interested in the bid)

is or are the only persons interested in the profits of any contract which may result from herein contained proposal; that the said proposal is made without any connection or interests in the profit thereof with any other person making any other bid or proposal for said work; that the said proposal is in all respects fair, and without collusion or fraud; and also that no member of Canton Drop Forge, head of any department or bureau of employee therein, or any officer of Canton Drop Forge, is directly or indirectly interested therein; and that all the statements made by him in this proposal are true.

Signed: _____ Title: _____
Affiant

Subscribed and sworn before me this _____ day of _____ 19 _____

_____ Notary Public

NOTICE OF AWARD

To: _____

Address: _____

INDUSTRIAL PRETREATMENT, CANTON DROP FORGE
^{SYSTEM}

Canton Drop Forge has considered the bid submitted by you on _____, 1995, for the above mentioned work in response to its advertisement for bids.

You are hereby notified that your bid in the amount of \$ _____ has been accepted.

You are required by the Information and Instructions to Bidders to execute the contract and furnish the required delinquent personal property tax affidavit, performance bond, certificate of insurance and a copy of your current Workmen's Compensation Certificate within 10 calendar days from the date of this notice.

If you fail to comply with the above requirements, Canton Drop Forge will be entitled to consider all of your rights arising out of the CDF's acceptance of your bid as abandoned and as a forfeiture of your bid guaranty subject to the liability as set forth in Section 153.54 of the Ohio Revised Code. Canton Drop Forge will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this Notice of Award to Canton Drop Forge.

Date this _____ day of _____, 19____.

Canton Drop Forge

By: _____
Chairman

Acceptance of Notice:

Receipt of the above Notice of Award is hereby acknowledged by _____

_____ this the _____ day of _____ 19____.

Signature and Title: _____

Agreement
CONTRACT

system
For INDUSTRIAL PRETREATMENT, CANTON DROP FORGE, CANTON, OHIO.

THIS CONTRACT, made and entered into at _____, Ohio, this _____ day of _____, 1995, by and between Canton Drop Forge (CDF), hereinafter called CDF, and a corporation, partnership, individual or _____ known as _____, with an office located at _____, hereinafter called the "CONTRACTOR". *6F \$*

WITNESSETH: That the CONTRACTOR has agreed and by these presents does agree that the CONTRACTOR, for the consideration ~~hereinbefore mentioned~~ and contained in the proposal, and under penalty expressed in a bond bearing even date with these presents, and herein contained or hereunto annexed to furnish at his own cost and expense, all the necessary materials, labor, superintendence, tools and equipment, and shall execute, construct, finish and test in an expeditious, substantial and workmanlike manner, said improvements shown on the contract drawings described in the included specification or required by CDF, with all equipment and appurtenances, commencing work within (10) days from the date of notice from CDF to commence work and executing the same within the time and in the manner specified and in conformity with the requirements set forth in the specification herein contained or hereunto attached in accordance with the contract drawings of said work on file in the office of CDF and all to the acceptance of said CDF. **INSET A.** *Contractor as per*

The CONTRACTOR shall proceed with the said work in a prompt and diligent manner and shall do the several parts thereof at such times and in such order as the Engineer or his duly authorized agent may direct. Further, he shall complete the whole of said work in accordance with the specifications and contract drawings to the satisfaction of CDF and their Engineer.

If the CONTRACTOR shall fail to comply with any of the terms, conditions, provisions, or stipulations of this contract according to the true intent and meaning thereof, then CDF may avail itself of any or all remedies provided in that behalf in the contract, and shall have the right and power to proceed in accordance with provisions thereof.

Invitation
It is hereby agreed by the parties to this Contract that the provisions contained in the *Advertisement* for Bids, in "Information and Instructions to Bidders", in the "Proposal and Bid Form", in the "Insurance Specifications", in the "Performance Bond", and in the plans and specifications for the improvement, shall constitute integral parts of the agreement and collectively that they shall comprise and be known as the Contract. It is hereby mutually agreed that CDF is to pay and the CONTRACTOR is to receive, a full compensation for furnishing all materials and labor in building, constructing, and in all respects completing the herein described work and appurtenances in the manner and *sets that was done*

under the conditions herein specified, the prices stipulated in the proposal herein contained or hereto annexed.

The CONTRACTOR agrees not to discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

Subject to the applicable provisions of law, this Contract shall be in full force and effect as a contract from and after the date when a fully executed and approved counterpart hereof is delivered to the CONTRACTOR.

IN WITNESS WHEREOF, the parties hereunto affixed their signatures, the day and year first above mentioned.

CONTRACTOR

Witness: _____ By: _____

Date: _____ Title: _____

If the Contractor is a corporation
the corporate seal must be affixed
hereon)

CANTON DROP FORGE

Attest: _____ By: _____

Date: _____

Approved as to form and legal sufficiency

Law Director

Date

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned _____,

as Principal and _____, as Sureties, are hereby held and

firmly bound unto Canton Drop Forge (CDF), in the penal sum of _____

Dollars (\$_____), for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns.

THE CONDITION OF THE ABOVE OBLIGATION IS SUCH, that whereas the above named Principal did on the _____ day of _____, 19____, enter into a contract with CDF for the INDUSTRIAL PRETREATMENT SYSTEM, CDF which said contract is made a part of this bond the same as though set forth herein;

Now, if the said Principal, _____, shall well and faithfully do and perform the things agreed by the Principal to be done and performed according to the terms of said contract; and shall pay all lawful claims of subcontractors, materialmen, and laborers, for labor performed and materials furnished in the carrying forward, performing, or completing of said contract; we agreeing and assenting that this undertaking shall be for the benefit of any materialman or laborer having a just claim, as well as for the Obligee herein; then this obligation shall be void; otherwise the same shall remain in full force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall in no event exceed the penal amount of this obligation as herein stated.

The said Surety hereby stipulates and agrees that no modifications, omissions, or additions, in or to the terms of said contract or in or to the plans or specifications thereof shall in any way affect the obligations of said Surety on its bond.

PROVIDE FURTHER, that no final settlement between CDF and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

Signed this _____ day of _____, 19____.

PRINCIPAL: _____

By: _____

Witness of Principal

Title: _____

SURETY: _____

By: _____

Witness of Attorney-in-Fact

Attorney-in-Fact
(Must be in Ohio)

(Facsimile signatures are not acceptable)

LABOR AND MATERIALMEN'S BOND

KNOW ALL MEN BY THESE PRESENTS, That we, _____, as Principal, and _____, as Surety, are held and firmly bound unto Canton Drop Forge (CDF), (hereinafter called the Obligee) in the penal sum of _____ (\$ _____) lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally, firmly by these presents:

WHEREAS, said Principal has entered into a certain contract with said Obligee, dated _____, 1995, (hereinafter called the Contract) for the INDUSTRIAL PRETREATMENT SYSTEM which contract and the specifications for said work shall be deemed a part hereof as fully as if set out herein.

NOW, THEREFORE, THE CONDITIONS OF THE OBLIGATION ARE SUCH that if said Principal and all subcontractors to whom any portion of the work provided for in said contract is sublet and all assignees of said Principal of such subcontractors, shall promptly make payment for all labor performed, services rendered, and materials furnished in the prosecution of the work provided for in said contract, or in any amendment or extension of, or addition to said contract, then the above obligation shall be void; otherwise to remain in full force and effect. PROVIDED, however, that this bond is subject to the following conditions and limitations.

- a. All persons who have performed labor, rendered services, or furnished materials or machinery as aforesaid, shall have a direct right of action against the Principal and Surety on this bond, which right of action shall be asserted in proceedings instituted in the State in which such labor was performed, services rendered or materials furnished under said contract in more than one State, then in any such States). Insofar as shall be asserted in a proceeding instituted in the name of the Obligee to the use and benefit of the person instituting such action and of all other persons having claims hereunder, and any other person having a claim hereunder, shall have the right to be made a party of such proceeding (but not later than one (1) year after the complete performance of said Contract and final settlement thereof) and to have such claim adjudicated in such action and judgment rendered thereon.
- b. The surety shall not be liable hereunder for any damages or compensation recoverable under any workers' compensation or employer's liability statute.

LABOR AND MATERIALMEN'S BOND

- c. In no event shall the Surety be liable for a greater sum than the penalty of this bond, or subject to any suit, action or proceeding thereon that is instituted later than one year after the complete performance of said Contract and final settlement thereof.
- d. As used herein, the term "person" refers to any person, firm, or corporation who has furnished materials or machinery to be used on or incorporated in the work or the prosecution thereof provided for in said contract or in any amendment or extension of or addition to said contract, and/or to any person engaged in the prosecution of the work provided for in said contract, or any amendment or extension of or addition to said contract, who is an agent, servant or employee of the Principal, or of any subcontractor, or of any assignee of said Principal, or of any subcontractor, and also anyone so engaged who performs the work of laborer or of a mechanic regardless of any contractual relationship between the principal of any subcontractor, or any assignee of said principal or of said Contractor, and such laborer or mechanic, but shall not include office employees not regularly stationed at the site of the work.

The said Surety, for value received, hereby stipulates and agrees that no charge, extension of time, alteration or addition to the terms of this contract or to the work to be performed thereunder or the specification accompanying the same, shall in any way effect its obligations on this bond and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

LABOR AND MATERIALMEN'S BOND

SIGNED, SEALED AND DELIVERED IN TRIPLICATE THIS day of _____, 1995.

INDIVIDUAL PRINCIPALS SIGN HERE

In the presence of:

_____(Seal)
_____(Seal)
_____(Seal)
_____(Seal)

(Corporate Principals sign here)

Attest: _____
By: _____

(Surety Sign Here)

Attest: _____
By: _____

Approved this _____ day of _____, 1995.

By: _____
Obligee Attorney-in-fact

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LABOR AND MATERIALMEN'S BOND

INSTRUCTIONS

1. The full Christian name and residence of each individual party of the bond must be inserted in the first paragraph.
2. If the principal is a partnership, the full names of all partners must be inserted in the first paragraph which must recite they are the partners composing the partnership (to be named) and all partners must execute the bond as individuals.
3. The State of incorporation of each corporate party to the bond must be inserted in the first paragraph and bond must be executed under the corporate seal of said party attested by its secretary or other appropriate officer.
4. The date of the bond must not be prior to the date of the contract.
5. Attorney-in-Fact must be in Ohio.

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GENERAL CONDITIONS

GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

1.1 Addenda: Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Bidding Requirements or the Contract Documents.

1.2 Agreement: The written contract between OWNER and CONTRACTOR covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

1.3 Application for Payment: The form accepted by ENGINEER which is to be used by CONTRACTOR in requesting progress of final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.4 Asbestos: Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United State Occupational Safety and Health Administration.

1.5 Bid: The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

1.6 Bidding Documents: The advertisement or invitation to Bid, instructions to bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

1.7 Bidding Requirements: The advertisement or invitation to Bid, instructions to bidders, and the Bid form.

1.8 Bonds: Performance and Payment bonds and other instruments of security.

1.9 Change Order: A document recommended by ENGINEER, which is signed by CONTRACTOR and OWNER and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

1.10 Contract Documents: The Agreement, Addenda (which pertain to the Contract Documents), CONTRACTOR's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary General Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders and ENGINEER's written interpretations and clarifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawings submittals approved pursuant to paragraphs 6.26 and 6.27 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.

1.11. Contract Price: The moneys payable by OWNER to CONTRACTOR for completion of the Work in accordance with the Contract Documents as stated in the Agreement, ~~(subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).~~

1.12. Contract Times: The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph 14.13.

1.13. CONTRACTOR: The person, firm or corporation with whom OWNER has entered into the Agreement.

1.14. Defective: An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to ENGINEER's recommendation of final payment (unless responsibility for the protection thereof has been assumed by OWNER at Substantial Completion in accordance with paragraph 14.8 or 14.10).

1.15. Drawings: The drawings which show the scope, extent and character of the Work to be furnished and performed by CONTRACTOR and which have been prepared or approved by ENGINEER and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

1.16. Effective Date of the Agreement: The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

Hammentree & Associates.

1.17. ENGINEER: ~~The person, firm or corporation named as such in the Agreement.~~

1.18. ENGINEER's Consultant: A person, firm or corporation having a contract with ENGINEER to furnish services as ENGINEER's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

1.19. Field Order: A written order issued by ENGINEER which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.

1.20. General Requirements - Sections of Division 1 of the Specifications.

1.21. Hazardous Waste - The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

1.22. Laws and Regulations; Laws or Regulations - Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

1.23. Liens - Liens, charges, security interests or encumbrances upon real property or personal property.

1.24. Milestone - a principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.25. Notice of Award - The written notice by OWNER to the apparent successful bidder stating that upon compliance by the apparent successful bidder with the conditions precedent enumerated therein, within the time specified, OWNER will sign and deliver the Agreement.

1.26. Notice to Proceed - A written notice given by OWNER to CONTRACTOR (with a copy to ENGINEER) fixing the date on which the Contract Times will commence to run and on which CONTRACTOR shall start to perform CONTRACTOR's obligations under the Contract Documents.

Canton Drop Forge
1.27. OWNER - ~~The public body or authority, corporation, association, firm or person with whom CONTRACTOR has entered into the Agreement and for whom the Work is to be provided.~~

1.28. Partial Utilization - Use by OWNER of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

1.29. PCBs - Polychlorinated biphenyls.

1.30. Petroleum - Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

1.31. Project - The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

1.32. Radioactive Material - Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

1.33. Resident Project Representative - The authorized representative of ENGINEER who may be assigned to the site or any part thereof.

1.34. Samples - Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

1.35. Shop Drawings - All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for CONTRACTOR and submitted by CONTRACTOR to illustrate some portion of the Work.

1.36. Specifications - Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative details applicable thereto.

1.37. Subcontractor - An individual, firm or corporation having a direct contract with CONTRACTOR or with any other Subcontractor for the performance of a part of the Work at the site.

1.38. Substantial Completion - The Work (or a specified part thereof) has progressed to the point where, in the opinion of ENGINEER as evidenced by ENGINEER's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by ENGINEER's written recommendation of final payment in accordance with paragraph

14.13. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.39. Supplementary General Conditions - The part of the Contract Documents which amends or supplements these General Conditions.

1.40. Supplier - A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with CONTRACTOR or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by CONTRACTOR or any Subcontractor.

1.41. Underground Facilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

~~1.42. Unit Price Work - Work to be paid for on the basis of unit prices.~~

1.43. Work - The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishing and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents. *INSERT A*

1.44. Work Change Directive - A written directive to CONTRACTOR, issued on or after the Effective Date of the Agreement and signed by OWNER and recommended by ENGINEER, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.23. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in paragraph 10.2.

1.45. Written Amendment - A written amendment of the Contract Documents, signed by OWNER and CONTRACTOR on or after the Effective Date of the Agreement and normally dealing with the nonengineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

ARTICLE 2 - PRELIMINARY MATTERS

Delivery of Bonds:

2.1 When CONTRACTOR delivers the executed Agreements to OWNER, CONTRACTOR shall also deliver to OWNER such Bonds as CONTRACTOR may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:

2.2 OWNER shall furnish to CONTRACTOR up to ten copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Times; Notice to Proceed:

2.3. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty days after the Effective Date of Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Work:

2.4. CONTRACTOR shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

Before Starting Construction:

2.5. Before undertaking each part of the Work, CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to ENGINEER any conflict, error, ambiguity or discrepancy with CONTRACTOR may discover and shall obtain a written interpretation or clarification from ENGINEER before proceeding with any Work affected thereby; however, CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents, unless CONTRACTOR knew or reasonably should have known thereof.

2.6. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), CONTRACTOR shall submit to ENGINEER for review:

2.6.1. A preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2.6.2. A preliminary schedule of Shop Drawings and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal;

2.6.3. A preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.7. Before any Work at the site is started, CONTRACTOR and OWNER shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which CONTRACTOR and OWNER respectively are required to purchase and maintain in accordance with paragraphs 5.4, 5.6, and 5.7.

Preconstruction Conference:

2.8. Within twenty days after the Contract Times start to run, but before any Work at the site is started, a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.6, procedures for handling Shop Drawings and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:

2.9. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by CONTRACTOR, ENGINEER and others as appropriate will be held to review for acceptability to ENGINEER as provided below the schedules submitted in accordance with paragraph 2.6. CONTRACTOR shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to CONTRACTOR until the schedules are submitted to and acceptable to ENGINEER as provided below. The progress schedule will be acceptable to ENGINEER as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on ENGINEER responsibility for the sequencing, scheduling or progress of the Work nor interfere with or relieve CONTRACTOR from CONTRACTOR's full responsibility therefor. CONTRACTOR's

schedule of Shop Drawing and Sample submissions will be acceptable to ENGINEER as providing a workable arrangement for reviewing and processing the required submittals. CONTRACTOR's schedule of values will be acceptable to ENGINEER as to form and substance.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:

3.1 The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases which have a well-known technical or construction industry or trade meaning are used to describe Work, materials or equipment, such words or phrases shall be interpreted in accordance with that meaning. Clarifications and interpretations of the Contract Documents shall be issued by ENGINEER as provided in paragraph 9.4.

3.3. Reference to Standards and Specification of Technical Societies; Reporting and Resolving Discrepancies:

3.3.1. Reference to standards, specifications, manuals or codes of any technical society, organization or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

3.3.2. If, during the performance of the Work, CONTRACTOR discovers any conflict, error, ambiguity or discrepancy within the Contract Documents or between the Contract Documents and any provisions of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual or code or of any instruction of any Supplier referred to in paragraph 6.5, CONTRACTOR shall report it to ENGINEER in writing at once, and, CONTRACTOR shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.23) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; provided, however, that CONTRACTOR shall not be liable to OWNER or ENGINEER for failure to report any such conflict, error, ambiguity or discrepancy unless CONTRACTOR knew or reasonably should have known thereof

3.3.3. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity or discrepancy between the provisions of the Contract Documents and:

3.3.3.1. the provisions of any such standard, specification, manual, code or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

3.3.3.2. the provisions of any such Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Laws or Regulations).

No provisions of any such standard, specification, manual, code or instruction shall be effective to change the duties and responsibilities of OWNER, CONTRACTOR, or ENGINEER, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to OWNER, ENGINEER or any of ENGINEER's Consultants, agents or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.4. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper" or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of ENGINEER as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to ENGINEER any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.5.1. a formal Written Amendment,

3.5.2. a Change Order (pursuant to paragraph 10.4), or

3.5.3. a Work Change Directive (pursuant to paragraph 10.1).

3.6. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

3.6.1. a Field Order (pursuant to paragraph 9.5),

3.6.2. ENGINEER's approval of a Shop Drawing or Sample (pursuant to paragraphs 6.26 and 6.27), or

3.6.3. ENGINEER's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.7. CONTRACTOR, and any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with OWNER (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specification or other documents (or copies of any thereof) prepared by or bearing the seal of ENGINEER or ENGINEER's Consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents or copies on extensions of the Project or any other project without written consent of OWNER and ENGINEER and specific written verification or adaption by ENGINEER.

ARTICLE 4 - AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

Availability of Lands:

4.1. OWNER shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of CONTRACTOR. Upon reasonable written request, OWNER shall furnish CONTRACTOR with a correct statement of record legal title and legal description of the lands upon which the Work is to be performed and OWNER's interest therein as necessary for giving notice of or filing a mechanic's lien against such lands in accordance with applicable Laws and Regulations. OWNER shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which CONTRACTOR will have to comply in performing the Work. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by OWNER, unless otherwise provided in the Contract Documents. If CONTRACTOR and OWNER are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in OWNER's furnishing these lands, rights-of-way or easements, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2. Subsurface and Physical Conditions:

4.2.1. Reports and Drawings: Reference is made to the Supplementary Conditions for identification of:

4.2.1.1. Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents; and

4.2.1.2. Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by ENGINEER in preparing the Contract Documents.

4.2.2. Limited Reliance by CONTRACTOR Authorized; Technical Data: CONTRACTOR may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," CONTRACTOR may not rely upon or make any claim against OWNER, ENGINEER, or any of ENGINEER's Consultants with respect to:

4.2.2.1. the completeness of such reports and drawings for CONTRACTOR's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by CONTRACTOR and safety precautions and programs incident thereto, or

4.2.2.2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings, or

4.2.2.3. any CONTRACTOR interpretation of or conclusions drawn from any "technical data" or any such data, interpretations, opinions or information.

4.2.3. Notice of Differing Subsurface or Physical Conditions: If CONTRACTOR believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

4.2.3.1. is of such a nature as to establish that any "technical data" on which CONTRACTOR is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2. is of such a nature as to require a change in the Contract Documents, or

4.2.3.3. differs materially from that shown or indicated in the Contract Documents, or

4.2.3.4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then

CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.23), notify OWNER and ENGINEER in writing about such condition. CONTRACTOR shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt or written order to do so.

4.2.4. ENGINEER's Review: ENGINEER will promptly review the pertinent conditions, determine the necessity of OWNER's obtaining additional exploration or tests with respect thereto and advise OWNER in writing (with a copy to CONTRACTOR) of ENGINEER's findings and conclusions.

4.2.5. Possible Contract Documents Change: If ENGINEER concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3., a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

4.2.6. Possible Price and Times Adjustments: An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in CONTRACTOR's cost of, or time required for performance of, the Work; subject, however, to the following:

4.2.6.1. such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4, inclusive;

4.2.6.2. a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment;

4.2.6.3. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract Price will be subject to the provisions of paragraphs 9.10 and 11.9; and

4.2.6.4. CONTRACTOR shall not be entitled to any adjustment in the Contract Price or Times if;

4.2.6.4.1. CONTRACTOR knew of the existence of such conditions at the time CONTRACTOR made a final commitment to OWNER in respect of Contract Price and Contract Times by the submission of a bid or becoming bound under a negotiated contract; or

4.2.6.4.2. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test or study of the site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for CONTRACTOR prior to CONTRACTOR's making such final commitment; or

4.2.6.4.3. CONTRACTOR failed to give the written notice within the time and as required by paragraph 4.2.3.

If OWNER and CONTRACTOR are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER, and ENGINEER's Consultant shall not be liable to CONTRACTOR for any claims, costs, losses or damages sustained by CONTRACTOR on or in connection with any other project or anticipated project.

4.3. Physical Conditions - Underground Facilities:

4.3.1. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to OWNER or ENGINEER by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

4.3.1.1. OWNER and ENGINEER shall not be responsible for the accuracy or completeness of any such information or data; and

4.3.1.2. The cost of all of the following will be included in the Contract Price and CONTRACTOR shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.2. Not Shown or Indicated: If any Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, CONTRACTOR shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.23), identify the owner of such Underground Facility and give written notice to that owner and to OWNER and ENGINEER. ENGINEER will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the Underground Facility. If ENGINEER concludes that a change in the Contract Documents is required, a Work Change Directive or Change Order will be issued as provided in Article 10 to reflect and document such consequences. During such time, CONTRACTOR shall be responsible for the safety and protection of such Underground Facility as provided in paragraphs 6.20. CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility

that was not shown or indicated in the Contract Documents and that CONTRACTOR did not know of and could not reasonably have been expected to be aware of or to have anticipated. If OWNER and CONTRACTOR are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12. However, OWNER, ENGINEER, and ENGINEER's Consultants shall not be liable to CONTRACTOR for any claims, costs, losses or damages incurred or sustained by CONTRACTOR on or in connection with any other project or anticipated project.

~~Reference Points:~~

~~4.4. OWNER shall provide engineering surveys to establish reference points for construction which in ENGINEER's judgment are necessary to enable CONTRACTOR to proceed with the Work. CONTRACTOR shall be responsible for laying out the Work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of OWNER. CONTRACTOR shall report to ENGINEER whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.~~

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4.5. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1. OWNER shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. OWNER shall not be responsible for any such materials brought to the site by CONTRACTOR, Subcontractor, Suppliers or anyone else for whom CONTRACTOR is responsible.

4.5.2. CONTRACTOR shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.23), and (ii) notify OWNER and ENGINEER (and thereafter confirm such notice in writing). OWNER shall promptly consult with ENGINEER concerning the necessity for OWNER to retain a qualified expert to evaluate such hazardous condition or take corrective action, if any. CONTRACTOR shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after OWNER has obtained any required permits related thereto and delivered to CONTRACTOR special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or

(ii) specifying any special conditions under which such Work may be resumed safely. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of any adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by CONTRACTOR to be resumed, either party may make a claim therefor as provided in Articles 11 and 12.

4.5.3. If after receipt of such special written notice CONTRACTOR does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then OWNER may order such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If OWNER and CONTRACTOR cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim therefor as provided in Articles 11 and 12. OWNER may have such deleted portion of the Work performed by OWNER's own forces or other in accordance with Article 7.

4.5.4. To the fullest extent permitted by Laws and Regulations, OWNER shall indemnify and hold harmless CONTRACTOR, Subcontractors, ENGINEERS, ENGINEER's Consultant and officers, directors, employees, agents, other consultants and subcontractors of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (ii) nothing in this subparagraph 4.5.4 shall obligate OWNER to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

4.5.5. The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5 - BONDS AND INSURANCE

Performance, Payment and Other Bonds:

5.1. CONTRACTOR shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all CONTRACTOR's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

5.2 If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.1, CONTRACTOR shall within ten days thereafter substitute another Bond and surety, both of which must be acceptable to OWNER.

5.3. Licensed Sureties and Insurers; Certificates of Insurance:

5.3.1. All Bonds and insurance required by the Contract Documents to be purchased and maintained by OWNER or CONTRACTOR shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverage so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.3.2. CONTRACTOR shall deliver to OWNER, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by OWNER or any other additional insured) which CONTRACTOR is required to purchase and maintain in accordance with paragraph 5.4. OWNER shall deliver to CONTRACTOR, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by CONTRACTOR or any other additional insured) which OWNER is required to purchase and maintain in accordance with paragraphs 5.6 and 5.7 hereof.

5.4.9. include completed operations insurance;

5.4.10. include contractual liability insurance covering CONTRACTOR's indemnity obligations under paragraphs 6.12, 6.16, and 6.31 through 6.33;

5.4.11. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least thirty days prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the CONTRACTOR pursuant to paragraph 5.3.2 will so provide);

5.4.12. remain in effect at least until final payment at all times thereafter when CONTRACTOR may be correcting, removing or replacing defective Work in accordance with paragraph 13.12; and

5.4.13. with respect to completed operations insurance, and any insurance coverage written on a claims-made basis, remain in effect for at least two years after final payment (and CONTRACTOR shall furnish OWNER and each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued evidence satisfactory to OWNER and any such additional insured of continuation of such insurance at final payment and one year thereafter).

OWNER's Liability Insurance:

5.5. In addition to the insurance required to be provided by CONTRACTOR under paragraph 5.4, OWNER, at OWNER's option, may purchase and maintain at OWNER's expense OWNER's own liability insurance as will protect OWNER against claims which may arise from operations under the Contract Documents.

Property Insurance:

5.6. Unless otherwise provided in the Supplementary Conditions, OWNER shall purchase and maintain property insurance upon the Work at the site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:

5.6.1. include the interest of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured;

5.6.2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework and Work in transit and shall insure against at least the following perils fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils as may be specifically required by the Supplementary Conditions;

5.6.3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);

5.6.4. cover materials and equipment stored at the site or at another location that was agreed to in writing by OWNER prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by ENGINEER; and

5.6.5. be maintained in effect until final payment is made unless otherwise agreed to in writing by OWNER, CONTRACTOR and ENGINEER with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

5.7. OWNER shall purchase and maintain such boiler and machinery insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interest of OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and any other persons or entities identified in the Supplementary Conditions, each of whom is deemed to have an insurable interest and shall be listed as an insured or additional insured.

5.8. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained by OWNER in accordance with paragraphs 5.6 and 5.7 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least thirty days' prior written notice has been given to OWNER and CONTRACTOR and to each other additional insured to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with paragraph 5.11.

5.9. OWNER shall not be responsible for purchasing and maintaining any property insurance to protect the interests of CONTRACTOR, Subcontractors or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount, will be borne by CONTRACTOR, Subcontractor or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.10. If CONTRACTOR requests in writing that other special insurance be included in the property insurance policies provided under paragraphs 5.6 or 5.7, OWNER shall, if possible, include such insurance, and the cost thereof will be charged to CONTRACTOR by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, OWNER shall in writing advise CONTRACTOR whether or not such other insurance has been procured by OWNER.

5.11. Waiver of Rights:

5.11.1 OWNER and CONTRACTOR intend that all policies purchased in accordance with paragraphs 5.6 and 5.7 will protect OWNER, CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds in such policies and will provide primary coverage for all losses and damages caused by the perils covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or additional insureds thereunder. OWNER and CONTRACTOR waive all rights against each other and their respective officers, directors, employees and agents for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors, ENGINEER, ENGINEER's Consultants and all other persons or entities identified in the Supplementary Conditions to be listed as insureds or additional insureds under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by OWNER as trustee or otherwise payable under any policy so issued.

5.11.2. In addition, OWNER waives all rights against CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them, for:

5.11.2.1. loss due to business interruption, loss of use or other consequential loss extending beyond direct physical loss or damage to OWNER's property or the Work caused by, arising out of or resulting from fire or other peril, whether or not insured by OWNER; and

5.11.2.2. loss or damage to the completed Project or part thereof caused by, arising out of or resulting from fire or other insured peril covered by any property insurance maintained on the complete Project or part thereof by OWNER during partial utilization pursuant to paragraph 14.10, after substantial completion pursuant to paragraph 14.8 or after final payment pursuant to paragraph 14.13.

Any insurance policy maintained by OWNER covering any loss, damage or consequential loss referred to in this paragraph 5.11.2 shall contain provisions to the effect that in the event of payment of any such loss, damage or consequential loss the insurers will have no rights of recovery against any of CONTRACTOR, Subcontractors, ENGINEER, ENGINEER's Consultants and the officers, directors, employees and agents of any of them.

Receipt and Application of Insurance Proceeds

5.12. Any insured loss under the policies of insurance required by paragraphs 5.6 and 5.7 will be adjusted with OWNER and made payable to OWNER as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. OWNER shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

5.13. OWNER as fiduciary shall have power to adjust and settle any loss with insurers unless one of the parties in interest shall object in writing within fifteen days after the occurrence of loss to OWNER's exercise of this power. If such objection be made, OWNER as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, OWNER as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, OWNER as fiduciary shall give bond for the proper performance of such duties.

Acceptance of Bonds and Insurance; Option to Replace:

5.14. If either party (OWNER or CONTRACTOR) has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.7. OWNER and CONTRACTOR shall each provide to the other such additional information in respect of insurance provided as the other may reasonable request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right of remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such

coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

Partial Utilization - Property Insurance

5.15. If OWNER finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. CONTRACTOR shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but CONTRACTOR shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in the expressly required by the Contract Documents. CONTRACTOR shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.2. CONTRACTOR shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to OWNER and ENGINEER except under extraordinary circumstances. The superintendent will be CONTRACTOR's representative at the site and shall have authority to act on behalf of CONTRACTOR. All communications to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials, and Equipment:

6.3. CONTRACTOR shall provide competent, suitably qualified personnel to survey, lay out and construct the Work as required by the Contract Documents. CONTRACTOR shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and CONTRACTOR will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without OWNER's written consent given after prior written notice to ENGINEER.

6.4. Unless otherwise specified in the General Requirements, CONTRACTOR shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.7.1.2. Substitute Items: If in ENGINEER's sole discretion an item of material or equipment proposed by CONTRACTOR does not qualify as an "or-equal" item under subparagraph 6.7.1.1, it will be considered a proposed substitute item. CONTRACTOR shall submit sufficient information as provided below to allow ENGINEER to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by the ENGINEER will include the following as supplemented in the General Requirements and as ENGINEER may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by ENGINEER from anyone other than CONTRACTOR. If CONTRACTOR wishes to furnish or use a substitute item of material or equipment, CONTRACTOR shall first make written application to ENGINEER for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice CONTRACTOR's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair, and replacement service will be indicated. The applications will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by ENGINEER in evaluating the proposed substitute. ENGINEER may require CONTRACTOR to furnish additional data about the proposed substitute.

6.7.1.3. CONTRACTOR's Expense: All data to be provided by CONTRACTOR in support of any proposed "or-equal" or substitute item will be at CONTRACTOR's expense.

6.7.2. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in and expressly required by the Contract Documents, CONTRACTOR may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to ENGINEER. CONTRACTOR shall submit sufficient information to allow ENGINEER, in

ENGINEER's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by ENGINEER will be similar to that provided in subparagraph 6.7.1.2.

6.7.3 Engineer's Evaluation: ENGINEER will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.2 and 6.7.2. ENGINEER will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without ENGINEER's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. OWNER may require CONTRACTOR to furnish at CONTRACTOR's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. ENGINEER will record time required by ENGINEER and ENGINEER's Consultant in evaluating substitutes proposed or submitted by CONTRACTOR pursuant to paragraphs 6.7.1.2 and 6.7.2 and in making changes in the Contract Documents (or in the provisions of any other direct contract with OWNER for work on the Project) occasioned thereby. Whether or not ENGINEER accepts a substitute item so proposed or submitted by CONTRACTOR, CONTRACTOR shall reimburse OWNER for the charges of ENGINEER and ENGINEER's Consultants for evaluating each such proposed substitute item.

6.8 Concerning Subcontractors, Suppliers and Others:

6.8.1. CONTRACTOR shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to OWNER and ENGINEER as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom OWNER or ENGINEER may have reasonable objection. CONTRACTOR shall not be required to employ any Subcontractor, Supplier or other person or organization to furnish or perform any of the Work against whom CONTRACTOR has reasonable objection.

6.8.2. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials or equipment) to be submitted to OWNER in advance of the specified date prior to the Effective Date of the Agreement for acceptance by OWNER and ENGINEER, and if CONTRACTOR has submitted a list thereof in accordance with the Supplementary Conditions, OWNER's or ENGINEER's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case CONTRACTOR shall submit an acceptable substitute, the Contract Price will be

adjusted by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by OWNER or ENGINEER of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of OWNER or ENGINEER to reject defective Work.

6.9.1. CONTRACTOR shall be fully responsible to OWNER and ENGINEER for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR just as CONTRACTOR is responsible for CONTRACTOR's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier or other person or organization any contractual relationship between OWNER or ENGINEER any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of OWNER or ENGINEER to pay, or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.9.2. CONTRACTOR shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with CONTRACTOR. ~~CONTRACTOR shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the ENGINEER through CONTRACTOR.~~

6.10. The division and sections of the Specifications and the identifications of any Drawings shall not control CONTRACTOR in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

6.11. All Work performed for CONTRACTOR by a Subcontractor or Supplier will be pursuant to an appropriate agreement between CONTRACTOR and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of OWNER and ENGINEER. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.6 or 5.7, the agreement between the CONTRACTOR and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier will waive all rights against OWNER, CONTRACTOR, ENGINEER, ENGINEER's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, CONTRACTOR will obtain the same.

Patent Fees and Royalties:

6.12. CONTRACTOR shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of OWNER or ENGINEER its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by OWNER in the Contract Documents. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents.

Permits:

6.13. Unless otherwise provided in the Supplementary General Conditions, ~~CONTRACTOR shall obtain and pay for all construction permits and licenses.~~ OWNER shall assist CONTRACTOR, when necessary, in obtaining such permits and licenses. CONTRACTOR shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. CONTRACTOR shall pay all charges of utility owners for connections to the Work, and OWNER shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

6.14 Laws and Regulations:

6.14.1. CONTRACTOR shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither OWNER nor ENGINEER shall be responsible for monitoring CONTRACTOR's compliance with any Laws or Regulations.

6.14.2 If CONTRACTOR performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, CONTRACTOR shall bear all claims, costs, losses and damages caused by, arising out of or resulting therefrom; however, it shall not be CONTRACTOR's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and

Regulations, but this shall not relieve CONTRACTOR, of CONTRACTOR's obligations under paragraph 3.3.2.

Taxes:

6.15. CONTRACTOR shall pay all sales, consumer, use and other similar taxes required to be paid by CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

Use of Premises:

6.16. CONTRACTOR shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, right-of-ways, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. CONTRACTOR shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, CONTRACTOR shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law. CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultant and anyone directly or indirectly employed by any of them from and against all claims, costs, losses, and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against OWNER, ENGINEER or any other party indemnified hereunder to the extent caused by or based upon CONTRACTOR's performance of the Work.

6.17. During the progress of the Work, CONTRACTOR shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work CONTRACTOR shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. CONTRACTOR shall leave the site clean and ready for occupancy by OWNER at Substantial Completion of the Work. CONTRACTOR shall restore to original condition all property not designated for alteration by the Contract Documents.

6.18. CONTRACTOR shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall CONTRACTOR subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

Record Documents:

6.19. CONTRACTOR shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to ENGINEER for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered to ENGINEER for OWNER.

Safety and Protection:

6.20. CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.20.1. all persons on the Work site or who may be affected by the Work.

6.20.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.20.3. other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.20.2 or 6.20.3 caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them).

CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR in accordance with paragraph 14.13 that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

Safety Representative:

6.21. CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

Hazard Communication Programs:

6.22. CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchange between or among employers at the site in accordance with Laws or Regulations.

Emergencies:

6.23. In emergencies affecting the safety or protection of persons or the Work of property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or ENGINEER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.24. Shop Drawings and Samples:

6.24.1. CONTRACTOR shall submit Shop Drawings to ENGINEER for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see paragraph 2.9). All submittals will be identified as ENGINEER may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to show ENGINEER the materials and equipment CONTRACTOR proposes to provide and to enable ENGINEER to review the information for the limited purposes required by paragraph 6.26.

6.24.2. CONTRACTOR shall also submit Samples to ENGINEER for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as ENGINEER may require to enable ENGINEER to review the submittal for the limited purposes required by paragraph 6.26. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.25. Submittal Procedures:

6.25.1. Before submitting each Shop Drawing or Sample, CONTRACTOR shall have determined and verified:

6.25.1.1. all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto,

6.25.1.2. all materials with respect to intended use, fabrication, shipping, handling, storage, assembly and installation pertaining to the performance of the Work, and

6.25.1.3. all information relative to CONTRACTOR's sole responsible in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

CONTRACTOR shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

6.25.2. Each submittal will bear a stamp or specific written indication that CONTRACTOR has satisfied CONTRACTOR's obligations under the Contract Documents with respect to CONTRACTOR's review and approval of that submittal.

6.25.3. At the time of each submission, CONTRACTOR shall give ENGINEER specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to ENGINEER for review and approval of each such variation.

6.26. ENGINEER will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by ENGINEER as required by paragraph 2.9. ENGINEER's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a particular means, method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. CONTRACTOR shall make corrections required by ENGINEER, and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. CONTRACTOR shall direct specific attention in writing to revisions other than the corrections called for by ENGINEER on previous submittals.

6.27. ENGINEER's review and approval of Shop Drawings or Samples shall not relieve CONTRACTOR from responsibility for any variation from the requirements of the Contract Documents unless CONTRACTOR has in writing called ENGINEER's attention to each such variation at the time of submission as required by paragraph 6.25.3 and ENGINEER has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval; nor will any approval by ENGINEER relieve CONTRACTOR from responsibility for complying with the requirements of paragraph 6.25.1.

6.28. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by ENGINEER as required by paragraph 2.9, any related Work performed prior to ENGINEER's review and approval of the pertinent submittal will be at the sole expense and responsibility of CONTRACTOR.

Continuing the Work:

6.29. CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with OWNER. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as OWNER and CONTRACTOR may otherwise agree in writing.

6.30. CONTRACTOR's General Warranty and Guarantee:

6.30.1. CONTRACTOR warrants and guarantees to OWNER, ENGINEER and ENGINEER's Consultants that all Work will be in accordance with the Contract

Documents and will not be defective. CONTRACTOR's warranty and guarantee hereunder excludes defects or damage caused by:

6.30.1.1. abuse, modification or improper maintenance or operation by persons other than CONTRACTOR, Subcontractor, or Suppliers; or

6.30.1.2. normal wear and tear under normal usage.

6.30.2. CONTRACTOR's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of CONTRACTOR's obligation to perform the Work in accordance with the Contract Documents:

6.30.2.1. observation by ENGINEER;

6.30.2.2. recommendation of any progress or final payment by ENGINEER;

6.30.2.3. the insurance of a certificate of Substantial Completion or any payment by OWNER to CONTRACTOR under the Contract Documents;

6.30.2.4. use or occupancy of the Work or any part thereof by OWNER;

6.30.2.5. any acceptance by OWNER or any failure to do so;

6.30.2.6. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by ENGINEER pursuant to paragraph 14.13;

6.30.2.7. any inspection, test or approval by others; or

6.30.2.8. any correction of defective Work by OWNER.

Indemnification:

6.31. To the fullest extent permitted by Laws and Regulations, CONTRACTOR shall indemnify and hold harmless OWNER, ENGINEER, ENGINEER's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the

Work itself), including the loss of use resulting therefrom, and (ii) is caused in whole or in part by any negligent act or omission of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.32. In any and all claims against OWNER or ENGINEER or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of CONTRACTOR, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.31 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for CONTRACTOR or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.33. The indemnification obligations of CONTRACTOR under paragraph 6.31 shall not extend to the liability of ENGINEER and ENGINEER's Consultants, officers, directors, employees or agents caused by the professional negligence, errors or omissions of any of them.

Survival of Obligations:

6.34. All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with the Contract Documents, as well as continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Agreement.

ARTICLES 7 - OTHER WORK

Related Work at Site:

7.1. OWNER may perform other work related to the Project at the site by OWNER's own forces, or let other direct contracts therefor which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then: (i) written notice thereof will be given to CONTRACTOR prior to starting any such other work, and (ii) CONTRACTOR may make a claim therefor as provided in Articles 11 and 12 if CONTRACTOR believes that such performance will involve additional expense to CONTRACTOR or requires additional time and the parties are unable to agree as to the amount or extent thereof.

7.2. CONTRACTOR shall afford each other contractor who is a party to such a direct contract and each utility owner (and OWNER, if OWNER is performing the additional work with OWNER's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work and theirs. Unless otherwise provided in the Contract Documents, CONTRACTOR shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. CONTRACTOR shall not endanger any work of others by cutting, excavating or other wise altering their work and will only cut or alter their work with the written consent of ENGINEER and the others whose work will be affected. The duties and responsibilities of CONTRACTOR under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of CONTRACTOR in said direct contracts between OWNER and such utility owners and other contractors.

7.3. If the proper execution or results of any part of CONTRACTOR's Work depends upon work performed by others under this Article 7, CONTRACTOR shall inspect such other work and promptly report to ENGINEER in writing any delays, defects or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of CONTRACTOR's Work. CONTRACTOR's failure so to report will constitute an acceptance of such other work as fit and proper for integration with CONTRACTOR's Work except for latent or nonapparent defects and deficiencies in such other work.

Coordination:

7.4. If OWNER contracts with others for the performance of other work on the Project at the site, the following will be set forth in Supplementary Conditions:

7.4.1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;

7.4.2. the specific matters to be covered by such authority and responsibility will be itemized; and

7.4.3. the extent of such authority and responsibilities will be provided.

Unless otherwise provided in the Supplementary General Conditions, OWNER shall have sole authority and responsibility in respect of such coordination.

ARTICLE 8 - OWNER'S RESPONSIBILITIES

8.1 Except as otherwise provided in these General Conditions, OWNER shall issue all communications to CONTRACTOR through ENGINEER.

8.2 In case of termination of the employment of ENGINEER, OWNER shall appoint an engineer against whom CONTRACTOR makes no reasonable objection, whose status under the Contract Documents shall be that of the former ENGINEER.

8.3 OWNER shall furnish the data required of OWNER under the Contract Documents promptly and shall make payments to CONTRACTOR promptly when they are due as provided in paragraphs 14.4 and 14.13.

8.4 OWNER's duties in respect of providing lands and easements and providing engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to OWNER's identifying and making available to CONTRACTOR copies of reports of explorations and tests of subsurface conditions at the site and drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by ENGINEER in preparing the Contract Documents.

8.5 OWNER's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.10.

8.6 OWNER is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7 OWNER's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8 In connection with OWNER's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with OWNER's right to terminate services of CONTRACTOR under certain circumstances.

8.9 The OWNER shall not supervise, direct, or have control or authority over, nor be responsible for, CONTRACTOR's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure to CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work. OWNER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

8.10 OWNER's responsibility in respect of undisclosed Asbestos, PCB's, Petroleum, Hazardous Waste or Radioactive Materials uncovered or revealed at the site is set forth in paragraph 4.5.

8.11. If and to the extent OWNER has agreed to furnish CONTRACTOR reasonable evidence that financial arrangements have been made to satisfy OWNER's obligations under the Contract Documents, OWNER's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION

OWNER's Representative:

9.1. ENGINEER will be OWNER's representative during the construction period. The duties and responsibilities and the limitations of authority of ENGINEER as OWNER's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of OWNER and ENGINEER.

Visits to Site:

9.2. ENGINEER will make visits to the site at intervals appropriate to the various stages of construction as ENGINEER deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of CONTRACTOR's executed Work. Based on information obtained during such visits and observations, ENGINEER will endeavor for the benefit of OWNER to determine, in general, if the Work is proceeding in accordance with the Contract Documents. ENGINEER will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. ENGINEER's efforts will be directed toward providing for OWNER a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and on-site observations, ENGINEER will keep OWNER informed of the progress of the Work and will endeavor to guard OWNER against defective Work. ENGINEER's visits and on-site observations are subject to all the limitations on ENGINEER's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of ENGINEER's on-site visits or observations of CONTRACTOR's Work ENGINEER will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work.

Project Representative:

9.3. If OWNER and ENGINEER agree, ENGINEER will furnish a Resident Project Representative to assist ENGINEER in providing more continuous observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.13 and in the Supplementary Conditions. If OWNER designates another representative or agent to represent OWNER at the site who is not ENGINEER's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other persons will be as provided in the Supplementary Conditions.

Clarifications and Interpretations:

9.4. ENGINEER will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as ENGINEER may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. Such written clarifications and interpretations will be binding on OWNER and CONTRACTOR. If OWNER or CONTRACTOR believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or Article 12.

Authorized Variations in Work:

9.5. ENGINEER may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on OWNER and also on CONTRACTOR who shall perform the Work involved promptly. If OWNER or CONTRACTOR believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree as to the amount or extent thereof, OWNER or CONTRACTOR may make a written claim therefor as provided in Article 11 or 12.

Rejecting Defective Work:

9.6. ENGINEER will have authority to disapprove or reject Work which ENGINEER believes to be defective, or that ENGINEER believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. ENGINEER will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

Shop Drawings, Change Orders, and Payments:

9.7. In connection with ENGINEER's authority as to Shop Drawings and Samples, see paragraphs 6.24 through 6.28 inclusive.

9.8. In connection with ENGINEER's authority as to Change Orders, see Articles 10, 11, and 12.

9.9. In connection with ENGINEER's authority as to Applications for Payment, see Article 14.

Determinations for Unit Prices:

9.10. ENGINEER will determine the actual quantities and classifications of Unit Price Work performed by CONTRACTOR. ENGINEER will review with the CONTRACTOR the ENGINEER's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). ENGINEER's written decision thereon will be final and binding upon OWNER and CONTRACTOR, unless, within ten days after the date of any such decisions, either OWNER or CONTRACTOR delivers to the other and to ENGINEER written notice of intention to appeal from ENGINEER's decision and: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in Exhibit GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to ENGINEER's decision, unless otherwise agreed in writing by OWNER and CONTRACTOR. Such appeal will not be subject to the procedures of paragraph 9.11.

Decisions on Disputes:

9.11. ENGINEER will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Times will be referred initially to ENGINEER in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant to ENGINEER and the other party to the Agreement promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to ENGINEER and the other party within sixty days after the start of such occurrence or event unless ENGINEER allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to ENGINEER and the claimant within thirty days after receipt of the claimant's last submittal (unless ENGINEER allows additional time). ENGINEER will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. ENGINEER's written decision on such claim, dispute or other matter will be final and binding upon OWNER and

CONTRACTOR unless: (i) an appeal from ENGINEER's decision is taken within the time limits and in accordance with the procedures set forth in EXHIBIT GC-A, "Dispute Resolution Agreement," entered into between OWNER and CONTRACTOR pursuant to Article 16, or (ii) if no such Dispute Resolution Agreement has been entered into, a written notice of intention to appeal from ENGINEER's written decision is delivered by OWNER or CONTRACTOR to the other and to ENGINEER within thirty days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty days of the date of such decision, unless otherwise agreed in writing by OWNER and CONTRACTOR.

9.12. When functioning as interpreter and judge under paragraphs 9.10 and 9.11, ENGINEER will not show partiality to OWNER or CONTRACTOR and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by ENGINEER pursuant to paragraphs 9.10 or 9.11 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.16) will be a condition precedent to any exercise by OWNER or CONTRACTOR of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter pursuant to Article 16.

9.13. Limitations on ENGINEER's Authority and Responsibilities:

9.13.1. Neither ENGINEER's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by ENGINEER in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise or performance of any authority or responsibility by ENGINEER shall create, impose or give rise to any duty owed by ENGINEER to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them.

9.13.2. ENGINEER will not supervise, direct, control or have authority over or be responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of the Work. ENGINEER will not be responsible for CONTRACTOR's failure to perform or furnish the Work in accordance with the Contract Documents.

9.13.3. ENGINEER will not be responsible for the acts or omissions of CONTRACTOR or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.13.4. ENGINEER's review of the final Application of Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests and approvals and Other documentation required to be delivered by paragraph 14.12 will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests and approvals that the results certified indicate compliance with, the Contract Documents.

9.13.5. The limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to ENGINEER's Consultants, Resident Project Representative and assistants.

ARTICLE 10 - CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, OWNER may, at any time or from time to time, order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, CONTRACTOR shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2. If OWNER and CONTRACTOR are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefor as provided in Article 11 or Article 12.

10.3. CONTRACTOR shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of an emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

10.4. OWNER and CONTRACTOR shall execute appropriate Change Orders recommended by ENGINEER (or Written Amendments) covering:

10.4.1. changes in the Work which are (i) ordered by OWNER pursuant to paragraph 10.1, (ii) required because of acceptance of defective Work under paragraph 13.13 or correcting defective Work under paragraph 13.14, or (iii) agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Times which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by ENGINEER pursuant to paragraph 9.11; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, CONTRACTOR shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.29.

10.5. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be CONTRACTOR's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 - CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by CONTRACTOR shall be at CONTRACTOR's expense without change in the Contract Price.

11.2. The Contract Price may only be changed by a Change Order or by a Written Amendment. Any claim for an adjustment in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty days after the start of such occurrence or event (unless ENGINEER allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in the Contract Price shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

11.3. The value of any Work covered by a Change Order or of any claim for an adjustment in the Contract Price will be determined as follows:

11.3.1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1 through 11.9.3, inclusive);

11.3.2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2);

11.3.3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 11.3.2, on the basis of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a CONTRACTOR's fee for overhead and profit (determined as provided in paragraph 11.6).

Cost of the Work:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by CONTRACTOR in the proper performance of the Work. Except as otherwise may be agreed to in writing by OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5:

11.4.1. Payroll costs for employees in the direct employ of CONTRACTOR in the performance of the Work under schedules of job classifications agreed upon by OWNER and CONTRACTOR. Such employees shall include without limitation superintendents, foremen and other personnel employed full-time at the site. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by OWNER.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to CONTRACTOR unless OWNER deposits funds with CONTRACTOR with which to make payments, in which case the cash discounts shall accrue to OWNER. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to OWNER, and CONTRACTOR shall make provisions so that they may be obtained.

11.4.3. Payments made by CONTRACTOR to the Subcontractors for Work performed or furnished by Subcontractors. If required by OWNER, CONTRACTOR shall obtain competitive bids from subcontractors acceptable to OWNER and CONTRACTOR and shall deliver such bids to OWNER who will then determine, with the advice of ENGINEER, which bids, if any, will be accepted. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as CONTRACTOR's Cost of the Work and fee as provided in paragraphs 11.4, 11.5, 11.6, and 11.7. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

11.4.5. Supplemental costs including the following:

11.4.5.1. The proportion of necessary transportation, travel and subsistence expenses of CONTRACTOR's employees incurred in discharge of duties connected with the Work.

11.4.5.2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the Workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of CONTRACTOR.

11.4.5.3. Rentals of all construction equipment and machinery and the parts thereof whether rented from CONTRACTOR or others in accordance with rental agreements approved by OWNER with the advice of ENGINEER, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof - all in accordance with the terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4. Sales, consumer, use or similar taxes related to the Work, and for which CONTRACTOR is liable, imposed by Laws and Regulations.

11.4.5.5. Deposits lost for causes other than negligence of CONTRACTOR, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

11.4.5.6. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by CONTRACTOR in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by OWNER in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of OWNER. No such losses, damages and expenses shall be included in the Cost of the Work for the purposes of determining CONTRACTOR's fee. If, however, any such loss or damage

requires reconstruction and CONTRACTOR is placed in charge thereof, CONTRACTOR shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone services at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work.

11.5. The term Cost of the Work shall not include any of the following:

11.5.1. Payroll costs and other compensation of CONTRACTOR's officers, executives, principals (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks and other personnel employed by CONTRACTOR whether at the site or in CONTRACTOR's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4 - all of which are to be considered administrative costs covered by the CONTRACTOR's fee.

11.5.2. Expenses of CONTRACTOR's principal and branch offices other than CONTRACTOR's office at the site.

11.5.3. Any part of CONTRACTOR's capital expenses, including interest on CONTRACTOR's capital employed for the Work and charges against CONTRACTOR for delinquent payments.

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not CONTRACTOR is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5. Costs due to the negligence of CONTRACTOR, any Subcontractor, or anyone directly or indirectly employed by any of them for whose acts any of them may be liable, including but not limited to, the correction of defective Work, dispose of materials or equipment wrongly supplied and making good any damage to property.

Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6. The CONTRACTOR's fee allowed to CONTRACTOR for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or

11.6.2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1. for costs incurred under paragraphs 11.4.1 and 11.4.2, the CONTRACTOR's fee shall be fifteen percent;

11.6.2.2. for costs incurred under paragraph 11.4.3, the CONTRACTOR's fee shall be five percent;

11.6.2.3. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 11.4.1, 11.4.2, 11.4.3, and 11.6.2 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of fifteen percent of the costs incurred by such Subcontractor under paragraphs 11.4.1 and 11.4.2 and that any higher tier Subcontractor and CONTRACTOR will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;

11.6.2.4. no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.5. the amount of credit to be allowed by CONTRACTOR to OWNER for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in CONTRACTOR's fee by an amount equal to five percent of such net decrease; and

11.6.2.6. when both additions and credits are involved in any one change, the adjustment in CONTRACTOR's fee shall be computed on the basis of the net change in accordance with paragraphs 11.6.2.1 through 11.6.2.5, inclusive.

11.7. Whenever the cost of any Work is to be determined pursuant to paragraphs 11.4 and 11.5, CONTRACTOR will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to ENGINEER an itemized cost breakdown together with supporting data.

Cash Allowances:

11.8. It is understood that CONTRACTOR has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be furnished and performed for such sums as may be acceptable to OWNER and ENGINEER. CONTRACTOR agrees that:

11.8.1. the allowances include the cost to CONTRACTOR (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

11.8.2. CONTRACTOR's costs for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances and no demand for additional payment on account of any of the foregoing will be valid.

Prior to final payment, an appropriate Change Order will be issued as recommended by ENGINEER to reflect actual amounts due CONTRACTOR on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.9. Unit Price Work:

11.9.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by CONTRACTOR will be made by ENGINEER in accordance with paragraph 9.10.

11.9.2. Each unit price will be deemed to include an amount considered by CONTRACTOR to be adequate to cover CONTRACTOR's overhead and profit for each separately identified item.

11.9.3. OWNER or CONTRACTOR may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

11.9.3.1. the quantity of any item of Unit Price Work performed by CONTRACTOR differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

11.9.3.2. there is no corresponding adjustment with respect to any other item of Work; and

11.9.3.3. if CONTRACTOR believes that CONTRACTOR is entitled to an increase in Contract Price as a result of having incurred additional expenses or OWNER believes that OWNER is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 - CHANGE OF CONTRACT TIMES

12.1. The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to ENGINEER promptly (but in no event later than thirty days) after occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless ENGINEER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims of adjustment in the Contract Times (or Milestones) shall be determined by ENGINEER in accordance with paragraph 9.11 if OWNER and CONTRACTOR cannot otherwise agree. No claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of CONTRACTOR, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a claim is made therefor as provided in paragraph 12.1. Delays beyond the control of CONTRACTOR shall include, but not be limited to, acts or neglect by OWNER, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplies shall be deemed to be delays within the control of CONTRACTOR.

12.4. Where CONTRACTOR is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both OWNER and CONTRACTOR, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be CONTRACTOR's sole and exclusive remedy for such delay. In no event shall OWNER be liable to CONTRACTOR, any Subcontractor, any Supplier, any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of CONTRACTOR, or (ii) delays beyond the control of both parties including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God or acts or neglect by utility owners or other contractors performing other work as contemplated by Article 7.

ARTICLE 13 - TEST AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1. Notice of Defects: Prompt notice of all defective Work to which OWNER or ENGINEER have actual knowledge will be given to CONTRACTOR. All defective Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. OWNER, ENGINEER, ENGINEER's Consultants, other representatives and personnel of OWNER, independent testing laboratories and governmental agencies with jurisdictional interest will have access to the Work at reasonable times for their observation, inspecting and testing. CONTRACTOR shall provide them proper and safe conditions for such access and advise them of CONTRACTOR's site safety procedures and programs so that they may comply therewith as applicable.

Tests and Inspections:

13.3. CONTRACTOR shall give ENGINEER timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

13.4. OWNER shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:

13.4.1. for inspections, tests or approvals covered by paragraph 13.5 below;

13.4.2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3. as otherwise specifically provided in the Contract Documents.

13.5. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, CONTRACTOR shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith, and furnish ENGINEER the required certificates of inspection, or approval. CONTRACTOR shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for OWNER's and ENGINEER's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to CONTRACTOR's purchase there for incorporation in the Work.

13.6. If any Work (or the work of others) that is to be inspected, tested or approved is covered by CONTRACTOR without written concurrence of ENGINEER, it must, if requested by ENGINEER, be uncovered for observation.

13.7. Uncovering Work as provided in paragraph 13.6 shall be at CONTRACTOR's expense unless CONTRACTOR has given ENGINEER timely notice of CONTRACTOR's intention to cover the same and ENGINEER has not acted with reasonable promptness in response to such notice.

Uncovering Work:

13.8. If any Work is covered contrary to the written request of ENGINEER, it must, if requested by ENGINEER, be uncovered for ENGINEER's observation and replaced at CONTRACTOR's expense.

13.9. If ENGINEER considers it necessary or advisable that covered Work be observed by ENGINEER or inspected or tested by others, CONTRACTOR, at ENGINEER's request, shall uncover, expose or otherwise make available for observation, inspection or testing as ENGINEER may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, CONTRACTOR shall pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 11. If, however, such Work is not found to be defective, CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

OWNER May Stop the Work:

13.10. If the Work is defective, or CONTRACTOR fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, OWNER may order CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of OWNER to stop the Work shall not give rise to any duty on the part of OWNER to exercise this right for the benefit of CONTRACTOR or any surety or other party.

Correction or Removal of Defective Work:

13.11. If required by ENGINEER, CONTRACTOR shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by ENGINEER, remove it from the site and replace it with Work that is not defective. CONTRACTOR shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12. Correction Period:

13.12.1. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provisions of the Contract Documents, any Work is found to be defective, CONTRACTOR shall promptly, without cost to OWNER and in accordance with OWNER's written instructions: (i) correct such defective Work, or, if it has been rejected by OWNER, remove it from the site and replace it with Work that is not defective, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk or loss or damage, OWNER may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by CONTRACTOR.

13.12.2. In special circumstances where a particular item of equipment is placed in continuous services before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

13.12.3. Where defective Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

Acceptance of Defective Work:

13.13. If, instead of requiring correction or removal and replacement of defective Work, OWNER (and, prior to ENGINEER's recommendation of final payment, also ENGINEER) prefers to accept it, OWNER may do so. CONTRACTOR shall pay all claims, costs, losses and damages attributable to OWNER's evaluation of and determination to accept such defective Work (such costs to be approved by

ENGINEER as to reasonableness). If any such acceptance occurs prior to ENGINEER's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by CONTRACTOR to OWNER.

OWNER May Correct Defective Work:

13.14. If CONTRACTOR fails within a reasonable time after written notice from ENGINEER to correct defective Work or to remove and replace rejected Work as required by ENGINEER in accordance with paragraph 13.11, or if CONTRACTOR fails to perform the Work in accordance with the Contract Documents, or if CONTRACTOR fails to comply with any other provisions of the Contract Documents, OWNER may, after seven days' written notice to CONTRACTOR, correct and remedy such deficiency. In exercising the rights and remedies under this paragraph OWNER shall proceed expeditiously. In connection with such corrective and remedial action, OWNER may exclude CONTRACTOR from all or part of the site, take possession of all or part of the Work, and suspend CONTRACTOR's services related thereto, take possession of CONTRACTOR's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere. CONTRACTOR shall allow OWNER, OWNER's representatives, agents and employees, OWNER's other contractors and ENGINEER and ENGINEER's Consultant access to the site to enable OWNER to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by OWNER in exercising such rights and remedies will be charged against CONTRACTOR and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and OWNER shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, OWNER may make a claim therefor as provided in Article 11. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of CONTRACTOR's defective Work. CONTRACTOR shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by OWNER of OWNER's rights and remedies hereunder.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to ENGINEER. Progress payments on account of Unit Price Work will be based on the number of units completed.

Application for Progress Payments:

14.2. At least twenty days before the date established for each progress payment (but not more often than once a month), CONTRACTOR shall submit to ENGINEER for review an Application for Payment filled out and signed by CONTRACTOR covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that OWNER has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect OWNER's interest therein, all of which will be satisfactory to OWNER. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

CONTRACTOR's Warranty of Title:

14.3. CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to OWNER no later than the time of payment free and clear of all Liens.

Review of Application for Progress Payment:

14.4. ENGINEER will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to OWNER, or return the Application to CONTRACTOR indicating in writing ENGINEER's reason for refusing or recommend payment. In the latter case, CONTRACTOR may make the necessary corrections and resubmit the Application. Ten days after presentation of the Application for Payment to OWNER with ENGINEER's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by OWNER to CONTRACTOR.

14.5. ENGINEER's recommendation of any payment requested in an Application for Payment will constitute a representation by ENGINEER to OWNER, based on ENGINEER's on-site observations of the executed Work as an experienced and qualified design professional and on ENGINEER's review of the Application for Payment and the accompanying data and schedules, that to the best of ENGINEER's knowledge, information and belief:

14.5.1. the Work has progressed to the point indicated,

14.5.2. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.10, and to any other qualifications stated in the recommendation), and

14.5.3. the conditions precedent to CONTRACTOR's being entitled to such payment appear to have been fulfilled in so far as it is ENGINEER's responsibility to observe the Work.

However, by recommending any such payment ENGINEER will not thereby be deemed to have represented that: (i) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to ENGINEER in the Contract Documents or (ii) that there may not be other matters or issues between the parties that might entitle CONTRACTOR to be paid additionally by OWNER or entitle OWNER to withhold payment to CONTRACTOR.

14.6. ENGINEER's recommendation of any payment, including final payment, shall not mean that ENGINEER is responsible for CONTRACTOR's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of CONTRACTOR to comply with Laws and Regulations applicable to the furnishing or performance of Work, or for any failure of CONTRACTOR to perform or furnish Work in accordance with the Contract Documents.

14.7. ENGINEER may refuse to recommend the whole or any part of any payment if, in ENGINEER's opinion, it would be incorrect to make the representations to OWNER referred to in paragraph 14.5. ENGINEER may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommend, to such extent as may be necessary in ENGINEER's opinion to protect OWNER from loss because:

14.7.1. the work is defective, or completed Work has been damaged requiring correction or replacement,

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order,

14.7.3. OWNER has been required to correct defective Work or complete Work in accordance with paragraph 13.14, or

14.7.4. ENGINEER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

OWNER may refuse to make payment of the full amount recommended by ENGINEER because:

14.7.5. claims have been made against OWNER on account of CONTRACTOR's performance or furnishing of the Work,

14.7.6. Liens have been filed in connection with the Work, except where CONTRACTOR has delivered a specific Bond satisfactory to OWNER to secure the satisfaction and discharge of such Liens.

14.7.7. there are other items entitling OWNER to a set-off against the amount recommended, or

14.7.8. OWNER has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.7.1 through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive; but OWNER must give CONTRACTOR immediate written notice (with a copy to ENGINEER) stating the reasons for such action and promptly pay CONTRACTOR the amount so withheld, or any adjustment thereto agreed to by OWNER and CONTRACTOR, when CONTRACTOR corrects to OWNER's satisfaction the reasons for such action.

Substantial Completion:

14.8. When CONTRACTOR considers the entire Work ready for its intended use CONTRACTOR shall notify OWNER and ENGINEER in writing that the entire Work is substantially complete (except for items specifically listed by CONTRACTOR as incomplete) and request that ENGINEER issue a certificate of Substantial Completion. Within a reasonable time thereafter, OWNER, CONTRACTOR and ENGINEER shall make an inspection of the Work to determine the status of completion. If ENGINEER does not consider the Work substantially complete, ENGINEER will notify CONTRACTOR in writing giving the reason therefor. If ENGINEER considers the Work substantially complete, ENGINEER will prepare and deliver to OWNER a tentative certificate of Substantial Completion which shall fix the date of Substantial

Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. OWNER shall have seven days after receipt of the tentative certificate during which to make written objection to ENGINEER as to any provisions of the certificate or attached list. If, after considering such objections, ENGINEER concludes that the Work is not substantially complete, ENGINEER will within fourteen days after submission of the tentative certificate to OWNER notify CONTRACTOR in writing, stating the reasons therefor. If, after consideration of OWNER's objections, ENGINEER considers the Work substantially complete, ENGINEER will within said fourteen days execute and deliver to OWNER and CONTRACTOR a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as ENGINEER believes justified after consideration of any objections from OWNER. At the time of delivery of the tentative certificate of Substantial Completion ENGINEER will deliver to OWNER and CONTRACTOR a written recommendation as to division of responsibilities pending final payment between OWNER and CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees. Unless OWNER and CONTRACTOR agree otherwise in writing and so inform ENGINEER in writing prior to ENGINEER's issuing the definitive certificate of Substantial Completion, ENGINEER's aforesaid recommendation will be binding on OWNER and CONTRACTOR until final payment.

14.9. OWNER shall have the right to exclude CONTRACTOR from Work after the date of Substantial Completion, but OWNER shall allow CONTRACTOR reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.10. Use by OWNER at OWNER's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) OWNER, ENGINEER and CONTRACTOR agree constitutes a separately functioning and usable part of the Work that can be used by OWNER for its intended purpose without significant interference with CONTRACTOR's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. OWNER at any time may request CONTRACTOR in writing to permit OWNER to use any such part of the Work which OWNER believes to be ready for its intended use and substantially complete. If CONTRACTOR agrees that such part of the Work is substantially complete, CONTRACTOR will certify to OWNER and ENGINEER that such part of the Work is substantially complete and request ENGINEER to issue a certificate of Substantial Completion for that part of the Work. CONTRACTOR at any time may notify OWNER and ENGINEER in writing that CONTRACTOR considers any such part of the Work ready for its intended use and substantially complete and request ENGINEER

to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, OWNER, CONTRACTOR and ENGINEER shall make an inspection of that part of the Work to determine its status of completion. If ENGINEER does not consider that part of the Work to be substantially complete, ENGINEER will notify OWNER and CONTRACTOR in writing giving the reasons therefor. If ENGINEER considers that part of the Work to be substantially complete, the provisions of paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.10.2. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.15 in respect of property insurance.

Final Inspection:

14.11. Upon written notice from CONTRACTOR that the entire Work or an agreed portion thereof is complete, ENGINEER will make a final inspection with OWNER and CONTRACTOR and will notify CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. CONTRACTOR shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

Final Application for Payment:

14.12. After CONTRACTOR has completed all such corrections to the satisfaction of ENGINEER and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.19) and other documents, CONTRACTOR may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by: (i) all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by subparagraph 5.4.13, (ii) consent of the surety, if any, to final payment, and (iii) complete and legally effective releases or waivers (satisfactory to OWNER) of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens and as approved by OWNER, CONTRACTOR may furnish receipts or releases in full and an affidavit of CONTRACTOR that: (i) the release and receipts include all labor, services, material and equipment for which a Lien could be filed, and (ii) all payrolls, material and equipment bills and other indebtedness connected with the Work for which OWNER or OWNER's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, CONTRACTOR may furnish

a Bond or other collateral satisfactory to OWNER to indemnify OWNER against any Lien.

Final Payment and Acceptance:

14.13. If, on the basis of ENGINEER's observation of the Work during construction and final inspection, and ENGINEER's review of the final Application of Payment and accompanying documentation as required by the Contract Documents, ENGINEER is satisfied that the Work has been completed and CONTRACTOR's other obligations under the Contract Documents have been fulfilled, ENGINEER will, within ten days after receipt of the final Application for Payment, indicate in writing ENGINEER's recommendation of payment and present the Application to OWNER for payment. At the same time ENGINEER will also give written notice to OWNER and CONTRACTOR that the Work is acceptable subject to the provisions of paragraph 14.15. Otherwise, ENGINEER will return the Application to CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case CONTRACTOR shall make the necessary corrections and resubmit the Application. Thirty days after the presentation to OWNER of the Application and accompanying documentation, in appropriate form and substance and with ENGINEER's recommendation and notice of acceptability, the amount recommended by ENGINEER will become due and will be paid by OWNER to CONTRACTOR.

14.14. If, through no fault of CONTRACTOR, final completion of the Work is significantly delayed and if ENGINEER so confirms, OWNER shall, upon receipt of CONTRACTOR's final Application for Payment and recommendation of ENGINEER, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by OWNER for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by CONTRACTOR to ENGINEER with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

Wavier of Claims:

14.15. The making and acceptance of final payment will constitute:

14.15.1. a waiver of all claims by OWNER against CONTRACTOR, except claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.11, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from CONTRACTOR's continuing obligations under the Contract Documents; and

14.15.2. a waiver of all claims by CONTRACTOR against OWNER other than those previously make in writing and still unsettled.

ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION

OWNER May Suspend Work:

15.1. At any time and without cause, OWNER may suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to CONTRACTOR and ENGINEER which will fix the date on which Work will be resumed. CONTRACTOR shall resume the Work on the date so fixed. CONTRACTOR shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if CONTRACTOR makes an approved claim therefor as provided in Articles 11 and 12.

OWNER May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if CONTRACTOR persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as adjusted from time to time pursuant to paragraph 6.6);

15.2.2. if CONTRACTOR disregards Laws or Regulations of any public body having jurisdiction;

15.2.3. if CONTRACTOR disregards the authority of ENGINEER; or

15.2.4. if CONTRACTOR otherwise violates in any substantial way any provisions of the Contract Documents;

OWNER may, after giving CONTRACTOR (and the surety, if any,) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of CONTRACTOR, exclude CONTRACTOR from the site and take possession of the Work and of all CONTRACTOR's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by CONTRACTOR (without liability to CONTRACTOR for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which OWNER has paid CONTRACTOR but which are stored elsewhere, and finish the Work as OWNER may deem expedient. In such case CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by OWNER arising out of or resulting from completing the Work such excess will be paid to CONTRACTOR. If such claims, costs, losses and damages exceed such unpaid balance, CONTRACTOR shall pay the difference to OWNER. Such claims, costs, losses and damages incurred by OWNER will be reviewed by

ENGINEER as to their reasonableness and when so approved by ENGINEER incorporated in a Change Order, provided that when exercising any rights or remedies under this paragraph OWNER shall not be required to obtain the lowest price for the Work performed.

15.3. Where CONTRACTOR's services have been so terminated by OWNER, the termination will not affect any rights or remedies of OWNER against CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of moneys due CONTRACTOR by OWNER will not release CONTRACTOR from liability.

15.4. Upon seven days' written notice to CONTRACTOR and ENGINEER, OWNER may, without cause and without prejudice to any other right or remedy of OWNER, elect to terminate the Agreement. In such case, CONTRACTOR shall be paid (without duplication of any items):

15.4.1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

15.4.2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

15.4.3. for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and

15.4.4. for reasonable expenses directly attributable to termination.

CONTRACTOR shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

CONTRACTOR May Stop Work or Terminate:

15.5. If, through no act or fault of CONTRACTOR, the Work is suspended for a period of more than ninety days by OWNER or under an order of court or other public authority, or ENGINEER fails to act on any Application for Payment within thirty days after it is submitted or OWNER fails for thirty days to pay CONTRACTOR any sum finally determined to be due, then CONTRACTOR may, upon seven days' written notice to OWNER and ENGINEER, and provided OWNER or ENGINEER do not remedy such suspension or failure within that time, terminate the Agreement and recover from OWNER payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if ENGINEER has failed to act on an Application for Payment within thirty days after it is submitted, or OWNER has failed for thirty days to pay CONTRACTOR any sum

finally determined to be due, CONTRACTOR may upon seven day's written notice to OWNER and ENGINEER stop the Work until payment of all such amount due CONTRACTOR, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude CONTRACTOR from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to CONTRACTOR's stopping Work as permitted by this paragraph.

ARTICLE 16 - DISPUTE RESOLUTION

If and to the extent that OWNER and CONTRACTOR have agreed on the method and procedure for resolving disputes between them that may arise under the Agreement, such dispute resolution method and procedure, if any, shall be as set forth in Exhibit GC-A, "Dispute Resolution Agreement," to be attached hereto and made a part hereof. If no such agreement on the method and procedure for resolving such disputes has been reached, and subject to the provisions of paragraphs 9.10, 9.11, and 9.12, OWNER and CONTRACTOR may exercise such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any dispute.

ARTICLE 17 - MISCELLANEOUS

Giving Notice:

17.1. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.2 Computation of Times:

17.2.1. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight will constitute a day.

Notice of Claim:

17.3. Should OWNER or CONTRACTOR suffer injury or damage to person or property because of any error, omission or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

Cumulative Remedies:

17.4. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon CONTRACTOR by paragraphs 6.12, 6.16, 6.30, 6.31, 6.32, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to OWNER and ENGINEER thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

Professional Fees and Court Costs Included:

17.5. Whenever references is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs.

**SUPPLEMENTAL
GENERAL CONDITIONS**

CDF005553

SUPPLEMENTAL GENERAL CONDITIONS

DEFINITIONS

Wherever the word "Engineer" is used herein, it shall be and is mutually understood to refer to the Engineer representing Canton Drop Forge (CDF) or his duly authorized representative or agent, limited by the particular duties entrusted to them.

Wherever the word "Contractor" is used herein, it shall be and is mutually understood to refer to the Party, or Parties, contracting to perform the work to be done under this contract, or the legal representatives of such Party or Parties, including all Subcontractors.

Wherever the word "Owner" is used herein, it shall be understood to refer to Canton Drop Forge, or to the duly authorized representative thereof.

NON-DISCRIMINATION IN EMPLOYMENT

The Contractor agrees that in the hiring of employees for the performance of work under this Contract or any subcontractor, neither the Contractor, nor any subcontractor, nor any person acting on behalf of either, shall discriminate against any applicant for employment of labor or workers who are qualified and available to perform the work to which the employment relates on account of race, color, religion, sex, handicap, or national origin; nor shall the Contractor, or any subcontractor, or any person acting on behalf of either, in any manner discriminate against or intimidate any employee hired for the performance of work under this Contract.

REFERENCE STANDARDS

Reference to the standards or specifications of any technical society, organization or association, shall mean the latest standard or specification adopted and published 60 days prior to the date of taking bids, unless specifically stated otherwise.

OHIO DEPARTMENT OF TRANSPORTATION SPECIFICATIONS

The Construction and Material Specifications of the Ohio Department of Transportation (ODOT) shall apply where noted on the plans and/or specifications. Each item or section referred to in the ODOT specifications shall have the same effect, application, and force as if produced in their entirety herein.

Notice should be taken that the specifications to be used for the method of construction installation, the acceptance of the referenced item(s), and the unit of measure to be used for payment purpose may or may not correspond to that used by ODOT.

Where a specification contained herein modifies the ODOT specifications or a section thereof, the modification shall prevail without altering the force and application of the remaining section of the ODOT specifications.

TECHNICAL DATA

The oil/water separation system shall be required to treat all contact water and steam to no more than 10 mg/l oil and grease. The successful bidder will be required to submit pilot tests or treatability studies sufficient to provide consist results in the effluents being discharged to Lagoons #1 and #2. The bidder is to become familiar with the oil/water separation design report herein attached under "Technical Specifications".

EXTRA WORK

Extra work, when deemed necessary, may be ordered by the Engineer. When extra work items are not stipulated in the estimated quantities or compensation covered under unit prices, the amount to be paid for extra work shall be agreed upon by both the Contractor and CDF. The additional compensation for extra work shall be approved by CDF, as a supplement to the contract, prior to undertaking the work.

DELIVERY AND RECEIPT OF MATERIALS

CDF will not accept responsibility for the delivery and receipt of any items of equipment or materials.

Contractors supplying equipment or materials for this project shall make arrangements to have men available at the site to receive this equipment or materials when delivered.

Contractors shall make arrangements with CDF for storage of materials and equipment. They shall not use any portion of the street right-of-way for storage of material and equipment. Satisfactory protection against fire and theft shall be maintained for stored material and equipment by the Contractor.

PROTECTION OF WORK AND PROPERTY

The Contractor shall at all times safely guard CDF property from injury or loss in connection with this contract. He shall at all times safely guard and protect his own work and that of adjacent property from damage. All guard fences or barricades, lights and other facilities as required for protection by laws, regulations, local conditions and these specifications must be provided and maintained.

Any damage to new and existing, materials, work, structures, etc., shall be repaired or replaced to the satisfaction of CDF at the Contractor's expense.

Any existing or new work damaged by failure to provide protection for same shall be removed and replaced or repaired with new work at the Contractor's expense.

Any existing utilities damaged during construction shall be repaired or replaced by the Contractor to original condition at no expense to CDF.

PROTECTION OF PERSONS AND SAFETY

The Contractor is advised that during the construction of the project, the owners and operators of adjacent premises will occupy and operate their respective premises and carry on their everyday activities. It is the responsibility of the Contractor to conduct and schedule his work so as to cause the least interference to those everyday activities and to prevent undue noise and disturbance to the inhabitants of the buildings.

The Contractor shall provide, construct, maintain and remove all temporary barriers required for protection of persons and vehicles using adjacent buildings, all in accordance with state and local building codes and OSHA requirements.

All Contractors are reminded that all work must be in accordance with all local, state, and federal standards. In addition, the work is to be conducted in strict accordance with the Occupational Safety and Health Act of 1970 (OSHA), U.S. Department of Labor, including all subsequent amendments and additions, to provide safety and health protection for workers. The General Contractor shall be in charge of ascertaining that all other contractors connected with the project conform with the current (OSHA) safety and health regulations.

ESTIMATES FOR PAYMENT AND RETAINER

Contractor may submit an estimate of the amount and value of material in place and work done at any time during the contract, but not more often than once every 30 days. Partial payment to the Contractor for work performed or materials installed shall be based on an estimate, agreed to by both Contractor and Engineer, of the percent of work complete.

A retainer of ten percent (10%) shall be withheld from Contractors invoices until the contract is complete. Entire amount of retainer shall be paid to the Contractor upon approval of final invoice indicating satisfactory completion of all work.

No partial payment shall be construed as an acceptance, by the Engineer of any materials furnished or work done. Any or all estimates may be withheld indefinitely by CDF until the terms of this contract have been complied with by the Contractor.

INCIDENTAL WORK

All work to be done by the Contractor, specified or mentioned in the plans or specifications, as well as any minor details of the work not specifically mentioned but obviously necessary for the proper completion of the work, shall be included in the bid price. The Contractor will not be entitled to any extra or additional compensation for the same.

SCHEDULE OF WORK

The Contractor shall notify the Engineer and CDF 24 hours in advance of moving men, equipment or materials on the site and/or the initiation of any work, so the Engineer and CDF can arrange for inspection services.

CLEANING UP

Project area shall be kept free of waste materials accumulated by reason of work on the project. All packaging devices such as cartons, boxes, wrapping paper, etc., brought to the premises in connection with the work are to be removed as the work progresses. The premises shall be kept neat and orderly at all times. All materials, equipment and other debris shall be removed from the premises upon completion of each work day. Any public or private property which may have been damaged during construction by use or storage of materials and equipment shall be restored by the Contractor to the satisfaction of the Engineer.

SAFETY AND PROTECTION:

CONTRACTOR shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. CONTRACTOR shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

- All persons on the Work site or who may be affected by the Work.

- All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

- Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

CONTRACTOR shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss; and shall erect and maintain all necessary safeguards for such safety and protection. CONTRACTOR shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to under SAFETY AND PROTECTION herein caused, directly or indirectly, in whole or in part, by CONTRACTOR, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by CONTRACTOR (except damage or loss attributable to the fault of Drawings or

Specifications or to the acts or omissions of OWNER or ENGINEER or ENGINEER's Consultant or anyone employed by any of them or anyone for whose acts any of them May be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of CONTRACTOR or any Subcontractor, Supplier or their person or organization directly or indirectly employed by any of them). CONTRACTOR's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and ENGINEER has issued a notice to OWNER and CONTRACTOR that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

SAFETY REPRESENTATIVE:

CONTRACTOR shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervision of safety precautions and programs.

HAZARD COMMUNICATION PROGRAMS:

CONTRACTOR shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with Laws or Regulations.

EMERGENCIES:

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, CONTRACTOR, without special instruction or authorization from OWNER or ENGINEER, is obligated to act to prevent threatened damage, injury or loss. CONTRACTOR shall give ENGINEER prompt written notice if CONTRACTOR believes that any significant changes in Work or variations from the Contract Documents have been caused thereby. If ENGINEER determines that a change in the Contract Documents is required because of the action taken by CONTRACTOR in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

LIMITATIONS ON ENGINEER'S RESPONSIBILITIES:

Neither Engineer's authority to act under the preceding articles or elsewhere in the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of Engineer to Contractor, any Subcontractor, any manufacturer, fabricator, supplier or distributor, or any of their agents or employees or any other person performing any of the Work.

**INSURANCE
SPECIFICATIONS**

INSURANCE SPECIFICATIONS

The Contractor and all Subcontractors (hereinafter called the "Contractor") shall provide and maintain during the life of this contract the following minimum insurance, limits, and conditions:

COMPREHENSIVE GENERAL LIABILITY

The Comprehensive General Liability Coverage shall include Completed Operations -- Products Coverage, Personal Injury Coverage, and Contractual Liability Coverage.

The Comprehensive General Liability Coverage shall include Underground Hazards for sub-surface operations. Explosion and Collapse Liability coverage shall be determined by Canton Drop Forge (CDF) on the basis of specific construction exposures.

The minimum limits of liability shall be as follows, unless otherwise specifically required by special provisions in the specifications or this Contract.

AMOUNT OF CONTRACT:	UNDER \$50,000	OVER \$50,000
Bodily Injury Liability -		
Each Occurrence	\$300,000	\$500,000 <i>\$1,000,000</i>
Aggregate	\$300,000	\$500,000
Property Damage Liability -		
Each Occurrence	\$100,000	\$250,000
Aggregate	\$100,000	\$250,000

COMPREHENSIVE AUTOMOBILE LIABILITY

The Comprehensive Automobile Liability Coverage shall include Owned, Non-Owned, and Hired Coverage.

The minimum limits of liability shall be as follows, unless otherwise specifically required by special provisions in the specifications or this Contract:

AMOUNT OF AGREEMENT:	UNDER \$50,000	OVER \$50,000
Bodily Injury Liability -		
Each Person	\$100,000	\$500,000
Each Occurrence	\$300,000	\$500,000
Property Damage Liability -		
Each Occurrence	\$100,000	\$250,000

Any combination of underlying Comprehensive General/Automobile Liability coverage with Umbrella/Excess Liability coverage which provides the required Bodily Injury and Property Damage Liability coverages will be acceptable.

ERRORS & OMISSION INSURANCE

The Consultant shall carry and keep in full force and effect during the life of this Agreement professional liability insurance in an amount not less than One Million Dollars (\$1,000,000.00) for damages resulting from negligent acts, errors, or omissions in the professional services rendered by the Consultant under this Agreement. The Consultant shall give the Owner sixty (60) days written notice of cancellation or discontinuance of the policy up through the one year maintenance period after completion of construction. The Consultant shall add CDF as an additional insured.

CERTIFICATE OF INSURANCE

The Contractor shall file a Certificate of Insurance for all coverages required in these insurance specification on the ACORD 25 form (preferred), with CDF before starting work on this project, and shall keep such certificates current and on file with CDF for the life of this Contract.

SUBCONTRACTORS

The Insurance Specifications apply equally to all subcontractors.

NOTICE TO PROCEED

The Contractor shall not commence work under this contract until he has obtained all the insurance required herein, has submitted appropriate Certificates of Insurance to and received approval of CDF as evidenced by a Notice to Proceed.

WORKERS' COMPENSATION

The Contractor shall comply with the Ohio Workers' Compensation Act, and he shall relieve and protect CDF from any costs due to accidents or other liabilities mentioned in said Act. At the time of delivery of this contract and at such other times as may be requested, the contractor shall furnish official certificates or receipts showing compliance with the Act. If, for any reason employees engaged in the work of this Contract are not or cannot be protected directly under Workers' Compensation Act, the Contractor shall provide other and adequate compensation insurance for such employees together with proof thereof.

In case any of the work is sublet, the Contractor shall require the subcontractor to provide compensation insurance for those employees who are not covered by the Contractor himself, and he shall furnish evidence that such insurance is provided.

The Contractor shall not perform any work on this Contract until he has filed a copy of his current Workers' Compensation Certificate with CDF.

DETAIL
SPECIFICATIONS

SECTION 01039

COORDINATION AND MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination.
- B. Field engineering.
- C. Preconstruction meeting.
- E. Progress meetings.

1.2 COORDINATION

- A. Coordinate scheduling, submittals, and Work of the various sections of the Project Manual to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Verify utility requirements and characteristics of operating equipment are compatible with existing utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- C. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.3 FIELD ENGINEERING

- A. Employ a Land Surveyor registered in the State of Ohio and acceptable to Owner.
- B. Contractor to locate and protect survey control and reference points.
- C. Control datum for survey is that shown on Drawings.
- D. Verify set-backs and easements, confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.

1.4 PRECONSTRUCTION MEETING

- A. Owner will schedule a meeting after Notice of Award.
- B. Attendance Required: Owner, Engineer, and Contractor.
- C. Agenda:
 - 1. Execution of Owner-Contractor Agreement.
 - 2. Submission of executed bonds and insurance certificates.
 - 3. Distribution of Contract Documents.
 - 4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
 - 5. Designation of personnel representing the parties in Contract, and the Engineer.
 - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 - 7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

1.5 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems which impede planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Review of off-site fabrication and delivery schedules.
 - 7. Maintenance of progress schedule.
 - 8. Corrective measures to regain projected schedules.
 - 9. Planned progress during succeeding work period.
 - 10. Coordination of projected progress.

11. Maintenance of quality and work standards.
12. Effect of proposed changes on progress schedule and coordination.
13. Other business relating to Work.

- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

1.6 PREINSTALLATION MEETING

- A. When required in individual specification sections, convene a preinstallation meeting at work site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 1. Review conditions of installation, preparation and installation procedures.
 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Engineer, Owner, participants, and those affected by decisions made.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed Products list.
- D. Shop Drawings.
- E. Product Data.
- F. Samples.
- G. Manufacturer's installation instructions.
- H. Manufacturers' certificates.
- I. Construction photographs.

1.2 RELATED SECTIONS

- A. Section 01700 - Contract Closeout: Contract, manufacturers' certificates, and closeout submittals.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- C. Apply Contractor's stamp, signed or initialled certifying that review, verification of Products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and Contract Documents.

- D. Schedule submittals to expedite the Project, and deliver to Engineer at Hammontree & Associates, Limited, 5233 Stoneham Road, North Canton, Ohio 44720. Coordinate submission of related items.
- F. For each submittal for review, allow 10 days excluding delivery time to and from the contractor.
- G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- H. Provide space for Contractor and Engineer review stamps.
- I. Revise and resubmit, identify all changes made since previous submission.
- J. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with provisions.
- K. Submittals not requested will not be recognized or processed.

1.4 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedule in duplicate within 15 days after date established in Notice to Proceed.
- B. Revise and resubmit as required.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- F. Indicate estimated percentage of completion for each item of Work at each submission.
- G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by Allowances.

1.5 PROPOSED PRODUCTS LIST

- A. Within 15 days after date of Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.6 SHOP DRAWINGS

- A. Submit the number of opaque reproductions which Contractor requires, plus two copies which will be retained by Engineer.
- B. Shop Drawings: Submit for review. After review, produce copies and distribute in accordance with the SUBMITTAL PROCEDURES article above and for record documents purposes described in Section 01700 - CONTRACT CLOSEOUT.

1.7 PRODUCT DATA

- A. Submit the number of copies which the Contractor requires, plus two copies which will be retained by the Engineer.
- B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to this Project.
- D. After review distribute in accordance with the Submittal Procedures article above and provide copies for record documents described in Section 01700 - CONTRACT CLOSEOUT.

1.8 MANUFACTURER INSTALLATION INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, adjusting, and finishing, to Engineer in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.9 MANUFACTURER CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer to Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.10 CONSTRUCTION PHOTOGRAPHS

- A. Each month submit photographs with Application for Payment.
- B. Photographs: Two prints; color, 3 x 5 inch size; mounted on 8-1/2 x 11 paper, with left edge binding margin for three hole punch.
- C. Take a minimum of 5 site photographs from differing locations indicating the relative progress of the Work, 5 days maximum prior to submitting.
- D. Identify photographs with date, time, orientation, and project identification.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality assurance - control of installation.
- B. Tolerances
- C. References.
- F. Manufacturers' field services and reports.

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals: Submission of manufacturers' instructions and certificates.
- B. Section 01600 - Material and Equipment: Requirements for material and product quality.

1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, Products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.

- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 TOLERANCES

- A. Monitor tolerance control of installed Products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust Products to appropriate dimensions; position before securing Products in place.

1.5 REFERENCES

- A. For Products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents date except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. The contractual relationship, duties, and responsibilities of the parties in Contract nor those of the Engineer shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.7 INSPECTING AND TESTING LABORATORY SERVICES

- A. Owner will appoint, employ, and pay for specified services of an independent firm to perform inspecting and testing.
- B. The independent firm will perform inspections, tests, and other services specified in individual specification sections and as required by the Engineer or the Owner.

- C. Inspecting, testing, and source quality control may occur on or off the project site. Perform off-site inspecting or testing as required by the Engineer or the Owner.
- D. Reports will be submitted by the independent firm to the Engineer in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 24 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing or inspecting does not relieve Contractor to perform Work to contract requirements.
- G. Retesting required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for retesting will be charged to the Contractor by deducting inspecting or testing charges from the Contract Sum/Price.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities: Electricity, telephone service, water, and sanitary facilities.
- B. Temporary Controls: Barriers, enclosures and fencing, protection of the Work, and water control.
- C. Construction Facilities: Access roads, parking, progress cleaning, project signage, and temporary buildings.

1.2 RELATED SECTIONS

- A. Section 01700 - Contract Closeout: Final cleaning.

1.3 TEMPORARY ELECTRICITY

- A. Cost: By Contractor; provide and pay for power service required from source.
- B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required.
- E. Provide main service disconnect and overcurrent protection at convenient location.
- F. Permanent convenience receptacles may not be utilized during construction.

1.4 TELEPHONE SERVICE

- A. Provide, maintain and pay for telephone service to field office at time of project mobilization.

1.5 TEMPORARY WATER SERVICE

- A. Provide, maintain and pay for suitable quality water service required for construction operations.

- B. Owner will pay cost of water used. Exercise measures to conserve water.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.6 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures.

1.7 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.8 WATER CONTROL

- A. ~~Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.~~
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.9 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Prohibit traffic from landscaped areas.

1.10 SECURITY

- A. Provide security and facilities to protect Work from unauthorized entry, vandalism, or theft.

1.11 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Collect and remove waste materials, debris, and rubbish from site periodically and dispose off-site.

1.12 PROJECT IDENTIFICATION

- A. Provide 8 foot wide x 6 foot high project sign of exterior grade plywood and wood frame construction, painted, to Engineer's design and colors.
- B. List title of Project, names of Owner, Engineer, professional sub-consultants, Contractor, and major Subcontractors.
- C. Erect on site at location established by Engineer.
- D. No other signs are allowed without Owner permission except those required by law.

1.13 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion Final Application for Payment inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Product options.
- E. Substitutions.

1.2 RELATED SECTIONS

- A. Instructions to Bidders: Product options and substitution procedures.
- B. Section 01400 - Quality Control: Product quality monitoring.

1.3 PRODUCTS

- A. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.5 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturers' instructions, with seals and labels intact and legible.

- B. For exterior storage of fabricated Products, place on sloped supports, above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of Product.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.

1.6 PRODUCT OPTIONS

- A. ~~Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.~~
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.7 SUBSTITUTIONS

- A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this section.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.

- D. A request constitutes a representation that the Contractor:
1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 2. Will provide the same warranty for the Substitution as for the specified Product.
 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 5. Will reimburse Owner and Engineer for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
 3. The Engineer will notify Contractor in writing of decision to accept or reject request.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Adjusting.
- D. Project record documents.
- E. Warranties.

1.2 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls:
Progress cleaning.

1.3 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.4 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.5 ADJUSTING

- A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.6 PROJECT RECORD DOCUMENTS

- A. Maintain on site, one set of the following record documents; record actual revisions to the Work:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, Product Data, and Samples.
 - 6. Manufacturer's instruction for assembly, installation, and adjusting.
 - B. Ensure entries are complete and accurate, enabling future reference by Owner.
 - C. Store record documents separate from documents used for construction.
 - D. Record information concurrent with construction progress.
-
- E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
 - 1. Manufacturer's name and product model and number.
 - 2. Product substitutions or alternates utilized.
 - 3. Changes made by Addenda and modifications.
 - F. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
 - 1. Measured depths of foundations in relation to finish main floor datum.
 - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
 - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
 - 4. Field changes of dimension and detail.
 - 5. Details not on original Contract drawings.
 - G. Remove Engineer title block and seal from all documents.
 - H. Submit documents to Engineer with claim for final Application for Payment.

1.8 WARRANTIES

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, suppliers, and manufacturers.
- C. Provide Table of Contents and assemble in binder with cover.
- D. Submit prior to final Application for Payment.
- E. For items of Work delayed beyond date of Substantial Completion, provide updated submittal within 10 days after acceptance, listing date of acceptance as start of warranty period.

END OF SECTION

SECTION 02200
EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work included: Excavate, backfill, compact, and grade the site to the elevations shown on the Drawings, as specified herein, and as needed to meet the requirements of the construction shown in the Contract Documents.
- B. Related Work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02010: Soils report and soil engineer.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work of this Section in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the soil engineer.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Fill and Backfill materials
 - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
 - 2. Fill material is subject to the approval of the soil engineer, and is that material removed from excavations or imported from off-site borrow areas,

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predominately granular, non-expansive soils free from roots and other deleterious matter.

3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill or embankment.
4. Cohesionless material used for structural backfill: Provide sand free from organic material and other foreign matter, and as approved by the soil engineer.
5. Where granular base is called for under building slabs, provide aggregate complying with requirements of Section 03300 of these Specifications.

2.2 WEED KILLER

- A. Provide a dry, free-flowing, dust-free chemical compound, soluble in water, capable of inhibiting growth of vegetation, and approved for use on this Work by governmental agencies having jurisdiction.

2.3 TOPSOIL

- A. Where and if shown on the Drawings or otherwise required, provide topsoil consisting of friable, fertile soil of loamy character, containing an amount of organic matter normal to the region, capable of sustaining healthy plant life, and reasonable free from subsoil, roots, heavy or stiff clay, stones larger than 2" in greatest dimension, noxious weeds, sticks, brush, litter, and other deleterious matter.
- B. Obtain topsoil from sources within the project limits, or provide imported topsoil obtained from sources outside the project limits, or from both sources.

2.4 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provisions of Section 01050.

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3.3 PROCEDURES

A. Utilities:

1. Unless shown to be removed, protect active utility lines shown on the Drawings or otherwise make known to the Contractor prior to excavating. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. Dewatering:

1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
2. Keep excavations and site construction area free from water.

D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times

3.4 EXCAVATING

- #### A. Perform excavating of every type of material encountered within the limits of the Work to the lines, grades, and elevations indicated and specified herein.

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B. Satisfactory excavated materials:

1. Transport to, and place in, fill or embankment areas within the limits of the Work.

C. Unsatisfactory excavated materials:

1. Excavate to a distance below grade as directed by the soil engineer, and replace with satisfactory materials.
2. Include excavation of unsatisfactory materials, and replacement by satisfactory materials, as part of the work of this Section.

D. Surplus materials:

1. Dispose of unsatisfactory excavated material, and surplus satisfactory excavated material, away from the site at disposal areas arranged and paid for by the Contractor.

E. Excavation of rock:

1. Where rocks, boulders, granite, or similar material is encountered, and where such material cannot be removed or excavated by conventional earth moving or ripping equipment, take required steps to proceed with the general grading operations of the Work, and remove or excavate such material by means which will neither cause additional cost to the Owner nor endanger buildings or structures whether on or off the site.
2. Do not use explosives without written permission from the Engineer.

F. Excavate and backfill in a manner and sequence that will provide proper drainage at all times.

G. Borrow:

1. Obtain material required for fill or embankment in excess of that produced within the grading limits of the Work from borrow areas selected and paid for by the Contractor and approved by the soil engineer.

H. Ditches and gutters:

1. Cut accurately to the cross sections, grades, and elevations shown.
2. Maintain excavations free from detrimental quantities or leaves, sticks, trash, and other debris until completion of the Work.
3. Dispose of excavated materials as shown on the Drawings or directed by the soil engineer; except do not, in any case, deposit materials less than 3'-0" from the edge of a ditch.

I. Unauthorized excavation:

1. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific instruction from the Engineer or the soil engineer.
2. Under footings, foundations, or retaining walls:

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- a. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevations.
 - b. When acceptable to the soil engineer, lean concrete fill may be used to bring the bottom elevation to proper position.
3. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the soil engineer.

J. Stability of excavations:

1. Slope sides of excavations to 1:1 or flatter, unless otherwise directed by the soil engineer.
2. Shore and brace where sloping is not possible because of space restrictions or stability of the materials being excavated.
3. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.

K. Shoring and bracing:

1. Provide materials for shoring and bracing as may be necessary for safety or personnel, protection of work, and compliance with requirements of governmental agencies having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of the time period excavations will be open.
3. Carry shoring and bracing down as excavation progresses.

L. Excavating for structures:

1. Conform to elevations and dimensions shown within a tolerance of 0.10 ft., and extending a sufficient distance from footings and foundations to permit placing and removing concrete formwork, installation of services, other construction required, and for inspection.
2. In excavating for footings and foundations, take care not to disturb bottom of excavation:
 - a. Excavate by hand tools to final grade just before concrete is placed.
 - b. Trim bottoms to required lines and grades to leave solid base to receive concrete.
3. Excavate for footings and foundations only after general site excavating, filling, and grading are complete.

M. Excavating for pavements:

1. Cut surface under pavements to comply with cross sections, elevations, and grades.

N. Cold weather protection:

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35 degrees F.

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3.5 FILLING AND BACKFILLING

A. General:

1. For each classification listed below, place acceptable soil material in layers to require subgrade elevations.
2. In excavations:
 - a. Use satisfactory excavated or borrow material.
3. Under asphalt pavements:
 - a. Use subbase materials.
4. Under building slabs:
 - a. Use granular fill, if so called for on the Drawings, complying with aggregate acceptable under Section 03300 of these Specifications.

B. Backfill excavations as promptly as progress of the Work permits, but not until completion of the following.

1. Acceptance of construction below finish grade including, where applicable, dampproofing and waterproofing.
2. Inspecting, testing, approving, and recording locations of underground utilities.
3. Removing concrete formwork.
4. Removing shoring and bracing, and backfilling of voids with satisfactory materials.
5. Removing trash and debris.
6. Placement of horizontal bracing on horizontally supported walls.

C. Ground surface preparation:

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious matter from ground surface prior to placement of fills.
2. Plow, strip, or break up sloped surfaces steeper than on vertical to four horizontal so that fill material will bond with existing surface.
3. When existing ground surface has a density less than that specified under "compacting" for the particular area, break up the ground surface, pulverize, moisture-condition to the optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placing and compacting:

1. Place backfill and fill materials in layers not more than 8" in loose depth.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.

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6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.
7. Where the construction includes basement or other underground walls having structural floors over them, do not backfill such walls until the structural floors are in place and have attained sufficient strength to support the walls.

3.6 GRADING

A. General:

1. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
2. Smooth the finished surfaces within specified tolerance.
3. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
4. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.

B. Grading outside building lines:

1. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.
2. Finish the surfaces to be free from irregular surface changes, and:
 - a. Shape the surface of areas scheduled to be under walks to line, grade, and cross-section, with finished surface not more than 0.10 ft. above or below the required subgrade elevation.
 - b. Shape the surface of areas scheduled to be under pavement to line, grade, and cross-section, with finished surface not more than 0.05 ft. above or below the required subgrade elevation.

3.7 COMPACTING

- A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1557.
- B. Provide not less than the following maximum density of soil material compacted at optimum moisture content for the actual density of each layer of soil material in place, and as approved by the soil engineer.
 1. Structures:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 95% of maximum density.

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2. Lawn and unpaved areas:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
 - b. Compact the upper 12" of filled areas, or natural soils exposed by excavating, at 85% of maximum density.
3. Walks:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.
4. Pavements:
 - a. Compact the top 8" of subgrade and each layer of fill material or backfill material at 90% of maximum density.

C. Moisture control:

1. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer of soil material to prevent free water appearing on surface during or subsequent to compacting operations.
2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.
3. Soil material that has been removed because it is too wet to permit compacting may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value as determined by moisture-density relation tests approved by the soil engineer.

3.6 FIELD QUALITY CONTROL

- A. Secure the soil engineer's inspection and approval of subgrades and fill layers before subsequent construction is permitted thereon.
- B. Provide at least the following tests to the approval of the soil engineer:
 1. At paved areas, at least one field density test for every 2000 sq. ft. of paved area, but not less than three tests;
 2. In each compacted fill layer, one field density test for every 2000 sq. ft. of overlaying paved area, but not less than three tests.
- C. If, in the soil engineer's opinion based on reports of the testing laboratory, subgrade or fills which have been placed are below specified density, provide additional compacting and testing under the provisions of Section 01410 of these Specifications.

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3.9 MAINTENANCE

- A. Protection of newly graded areas:
 - 1. Protect newly graded areas from traffic and erosion, and keep free from trash and weeds;
 - 2. Repair and reestablish grades in settled, eroded, and rutted areas to the specified tolerances.
- B. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify the surface, reshape, and compact to the required density prior to further construction.

3.10 CERTIFICATION

- A. Upon completion of this portion of the Work, and as a condition of its acceptance, deliver to the Engineer a written report from the soil engineer certifying that the compaction requirements have been obtained. State in the report the area of fill or embankment, the compaction density obtained, and the type of classification of fill material placed.

END OF SECTION

EXCAVATING, BACKFILLING, AND COMPACTING

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SECTION 02221

TRENCHING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Trench, backfill, and compact as specified herein and as needed for installation of underground utilities associated with the Work.
- B. Related work:
 - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
 - 2. Section 02010: Soils report and soil engineer.

1.2 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Use equipment adequate in size, capacity, and numbers to accomplish the work in a timely manner.
- C. In addition to complying with requirements of governmental agencies having jurisdiction, comply with the directions of the soil engineer.

1.3 PRODUCT HANDLING

- A. Comply with pertinent provisions of Section 01640.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. Fill and backfill materials:
 - 1. Provide soil materials free from organic matter and deleterious substances, containing no rocks or lumps over 6" in greatest dimension, and with not more than 15% of the rocks or lumps larger than 2-3/8" in their greatest dimension.
 - 2. Fill material is subject to the approval of the soil engineer, and is that material removed from excavations or imported from off-site

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borrow areas, predominately granular, non-expansive soil free from roots and other deleterious matter.

3. Do not permit rocks having a dimension greater than 1" in the upper 12" of fill.
4. Cohesionless material used for backfill: Provide sand free from organic material and other foreign matter, and as approved by the soil engineer.

2.2 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISH ELEVATIONS AND LINES

- A. Comply with pertinent provision of Section 01050.

3.3 PROCEDURES

A. Utilities:

1. Unless shown to be removed, protect active utility lines shown on the drawings or otherwise made known to the Contractor prior to trenching. If damaged, repair or replace at no additional cost to the Owner.
2. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
3. If service is interrupted as a result of work under this Section, immediately restore service by repairing the damaged utility at no additional cost to the Owner.
4. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the Engineer and secure his instructions.
5. Do not proceed with permanent relocation of utilities until written instructions are received from the Engineer.

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B. Protection of persons and property:

1. Barricade open holes and depressions occurring as part of the Work, and post warning lights on property adjacent to or with public access.
2. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
3. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, washout, and other hazards created by operations under this Section.

C. Dewatering:

1. Remove all water, including rain water, encountered during trench and sub-structure work to an approved location by pumps, drains, and other approved methods.
2. Keep trenches and site construction area free from water.

D. Use means necessary to prevent dust from becoming a nuisance to the public, to neighbors, and to other work being performed on or near the site.

E. Maintain access to adjacent areas at all times.

3.4 TRENCHING

A. Comply with pertinent provisions of Section 02220, and the provisions of this Section.

B. Provide sheeting and shoring necessary for protection of the Work and for the safety of personnel.

1. Prior to backfilling, remove all sheeting.
2. Do not permit sheeting to remain in the trenches except when, in the opinion of the Engineer, field conditions or the type of sheeting or methods of construction such as use of concrete bedding are such as to make removal of sheeting impracticable. In such cases, the Engineer may permit portions of sheeting to be cut off and remain in the trench.

C. Open Cut:

1. Excavate for utilities by open cut.
2. If conditions at the site prevent such open cut, and if approved by the Engineer, trenching may be used.
3. Short sections of a trench may be tunneled if, in the opinion of the Engineer, the conductor can be installed safely and backfill can be compacted properly into such tunnel.

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4. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the soil engineer.
5. When the void is below the subgrade for the utility bedding, use suitable earth materials and compact to the relative density directed by the soil engineer, but in no case to a relative density less than 90%.
6. When the void is in the side of the utility trench or open cut, use suitable earth or sand compacted or consolidated as approved by the soil engineer, but in no case to a relative density less than 80%.
7. Remove boulders and other interfering objects, and backfill voids left by such removals, at no additional cost to the Owner.
8. Excavating for appurtenances:
 - a. Excavate for manholes and similar structures to a distance sufficient to leave at least 12" clear between outer surfaces and the embankment or shoring that may be used to hold and protect the banks.
 - b. Overdepth excavation beyond such appurtenances that has not been directed will be considered unauthorized. Fill with sand, gravel, or lean concrete as directed by the soil engineer, and at no additional cost to the Owner.

D. Trench to the minimum width necessary for proper installation of the utility, with sides as nearly vertical as possible. Accurately grade the bottom to provide uniform bearing for the utility.

E. Depressions:

1. Dig bell holes and depressions for joints after the trench has been graded. Provide uniform bearing for the pipe on prepared bottom of the trench.
2. Except where rock is encountered, do not excavate below the depth indicated or specified.
3. Where rock is encountered, excavate rock to a minimum overdepth of 4" below the trench depth indicated or specified.

F. Where utility runs traverse public property or are subject to governmental or utility company jurisdiction, provide depth, bedding, cover, and other requirements as set forth by legally constituted authority having jurisdiction, but in no case less than the depth shown in the Contract Documents.

G. Where trenching occurs in existing lawns, remove turf in sections and keep damp. Replace turf upon completion of the backfilling.

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H. Cover:

1. Provide minimum trench depth indicated below to maintain a minimum cover over the top of the installed item below the finish grade or subgrade:
 - a. Areas subject to vehicular traffic:

Sanitary sewers:	48"
Storm drains:	36"
 - b. Areas not subject to vehicular traffic:

Sanitary sewers	30"
Storm drains:	18"
 - c. All areas:

Water lines	48"
Natural gas lines:	24"
Electrical cables:	42"
Electrical ducts:	36"
 - d. Concrete encased:

Pipe sleeves for water and gas lines:	24"
Sanitary sewers and storm drains:	12"
Electrical ducts:	24"
2. Where utilities are under a concrete structure slab or pavement, the minimum depth need only be sufficient to completely encase the conduit or pipe sleeve, and electrical long-radius rigid metal conduit riser, provided it will not interfere with the structural integrity of the slab or pavement.
3. Where the minimum cover is not provided, encase the pipes in concrete as indicated. Provide concrete with a minimum 28 day compressive strength of 2500 psi.

3.5 BEDDING

- A. Provide bedding as indicated on the Drawings.

3.6 BACKFILLING

A. General:

1. Do not completely backfill trenches until required pressure and leakage tests have been performed, and until the utilities systems as installed conform to the requirements specified in the pertinent Sections of these Specifications.
2. Except as otherwise specified or directed for special conditions, backfill trenches to the ground surface with selected material approved by the soil engineer.
3. Reopen trenches which have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the soil engineer.

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4. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests, and approvals.
5. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such Work and, after approvals have been made, refill and compact as specified, all at no additional cost to the Owner.

B. Lower portion of trench:

1. Deposit approved backfill and bedding material in layers of 6" maximum thickness, and compact with suitable tampers to the density of the adjacent soil, or grade as specified herein, until there is a cover of not less than 24" over sewers and 12" over other utility lines.
2. Take special care in backfilling and bedding operations to not damage pipe and pipe coatings.

C. Remainder of trench:

1. Except for special materials for pavements, backfill the remainder of the trench with material free from stones larger than 6" of 1/2 the layered thickness, whichever is smaller, in any dimension.
2. Deposit backfill material in layers not exceeding the thickness specified, and compact each layer to the minimum density directed by the soil engineer.

D. Adjacent to buildings: Mechanically compact backfill within ten feet of buildings.

E. Consolidation of backfill by jetting with water may be permitted, when specifically approved by the soil engineer, in areas other than building and pavement areas.

3.7 TEST FOR DISPLACEMENT OF SEWERS AND STORMDRAINS

- A. Check sewers and stormdrains to determine whether displacement has occurred after the trench has been backfilled to above the pipe and has been compacted as specified.
- B. Flash a light between manholes or, if the manholes have not yet been constructed, between the locations of the manholes, by means of a flashlight or by reflecting sunlight with a mirror.
- C. If the illuminated interior of the pipe line shows poor alignment, displaced pipes, or any other defects, correct the defects to the specified conditions and at no additional cost to the Owner.

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3.8 PIPE JACKING

- A. The Contractor may, at his option, install steel pipe casings, tongue-and-groove reinforced concrete pipes, and steel pipes under existing roads or pavements by jacking into place using procedures approved by the governmental agencies having jurisdiction and approved by the soil engineer.

3.9 TUNNELING OPERATIONS

- A. The Contractor may, at his option, tunnel pipes into position using procedures approved by the soil engineer and the governmental agencies having jurisdiction.

3.10 FIELD QUALITY CONTROL

- A. The soil engineer will inspect the approve open cuts and trenches before installation of utilities, and will make the following tests:
 - 1. Assure the trenches are not backfilled until all tests have been completed;
 - 2. Check backfilling for proper layer thickness and compaction;
 - 3. Verify that test results conform to the specified requirements, and that sufficient tests are performed;
 - 4. Assure that defective work is removed and properly replaced.

END OF SECTION

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TRENCHING BACKFILLING, AND COMPACTING

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DETAILED SPECIFICATIONS

CLEARING AND GRUBBING

Item No. 2

1. Work Included: The contractor shall furnish all labor, material and equipment and perform all operations necessary to remove from the site of the work all vegetation, trash, rubbish and other unsuitable material which interferes with the completed work, or the removal of which is necessary to permit the construction of any part of the work under this contract, or which is required to give a completed appearance to any part of the work; including felling, cutting-up, removal and disposal of any trees and brush encountered. Fences, signs and all structures shall be removed only at the direction of the Engineer.

Special care shall be exercised to prevent damage to existing drainage culverts, sewers, waterlines, gas and oil lines, electric and telephone circuits, cables and any underground structures.

Wherever, in excavation, roots of trees are encountered, the cutting of which, in the opinion of the Engineer, will seriously injure the trees, the Contractor shall exert every precaution to avoid damage to, or cutting of such roots, and shall be responsible for damage to them, and shall replace at his expense any trees, lawns, shrubbery or similar vegetation damaged.

2. Clearing: Limits of clearing shall include the limits of construction as defined in the Contract Drawings. All other areas within the Project area shall be cleaned of all rubbish and fallen wood. All standing stumps and dead trees in the project area shall be cut off flush with the ground. The Engineer has the right to designate trees and other growth which the Owner may desire to leave standing. When such direction is given, the Contractor shall comply to such direction.
3. Grubbing: Limits of grubbing shall include the limits of excavation, embankment, structural foundation and slabs, roadway and sidewalk subgrades, ditch areas, and stream or channel change areas.
4. Disposal of Trees and Brush: The Contractor shall submit a detailed plan of proposed methods for disposal of trees and brush to the Engineer for written approval. The plan shall set forth the materials which the Contractor desires to burn, the periods of burning, the locations where burning will be conducted, and the controls and protection to be utilized during the periods of burning.

Prior to approval of the Contractor's plan by the Engineer, the Contractor shall obtain any necessary local and State permits to burn any materials. NO

DETAILED SPECIFICATIONS

BURNING WILL BE PERMITTED until copies of all permits issued have been filed with the Engineer.

5. Removal, Storage and Protection of Surface Items: The Contractor shall remove all salvageable surface items over the area to be excavated and shall separate, classify, store, protect and preserve such materials and items for use in replanting or restoring the area of construction to its original condition prior to construction, unless otherwise noted by the Engineer.

Any topsoil of a suitable character shall be placed aside in compacted embankments and seeded if necessary to prevent erosion for subsequent reuse in finish grading.

6. Price Breakdown: The Contractor shall provide to the Engineer the unit price breakdown of all the components of this lump sum item used in determining the bid price.
7. Compensation: The payment for all work under this item shall be the Contract lump sum price, as bid therefor for Item No. 2, which is the full compensation for all labor, materials, and equipment as herein specified.

DETAILED SPECIFICATIONS

UNCLASSIFIED EXCAVATION AND DISPOSAL

Item No. 3

1. Work Included: The work under this item shall include all labor, materials, and equipment required to make all trench, structural, roadway and other necessary excavations at the plant site, including the removal of rock and masonry and all other types of materials encountered, wet or dry, not included under other items which are specified under this Contract, shown on the Contract Plans or as ordered. This item shall include the disposal of all surplus material and the backfilling and rough grading of all excavations. Removal, storage, and protection of surface items shall be included under Item No. 2 "Clearing and Grubbing".

Excavations shall consist of the loosening, loading, removing, transporting and disposing of all material, wet or dry, necessary to be removed for the purpose of construction; the storage of excavated materials; backfilling and rough grading around finished structures; construction of embankments, and all work incidental to excavation and disposal.

This item shall also include all sheeting, shoring and bracing; all pumping, bailing and removal of water, all bulkhead work and drainage piping; and all other facilities necessary to maintain all excavations free from water and to prevent caving or running in, and any and all protective work required.

Existing structures encountered in the execution of work shall be satisfactorily protected to prevent damage, or shall be removed and disposed of if such is the requirement.

No classification will be made of excavated materials. Whatever materials are encountered in the excavation regardless of their character shall be removed, stored and reused for backfill where suitable under the Specifications, and unsuitable materials shall be removed from the site and properly disposed of by the Contractor.

2. General Excavation Requirements: All excavations shall be in accordance with the latest requirements of the Department of Labor Occupational Safety and Health Acts. The walls and faces of all excavations in which employees are exposed to danger from moving ground shall be guarded by a shoring system, sloping of the ground, or some other equivalent means.

Excavations shall be inspected by a competent person after every rainstorm or other hazard-increasing occurrence, and the protection against slides and cave-ins shall be increased if necessary.

DETAILED SPECIFICATIONS

Special precautions shall be taken in sloping or shoring the sides of excavations adjacent to a previously backfilled excavation or a fill, particularly when the separation is less than the depth of the excavation. Particular attention also shall be paid to joints and seams of material comprising a face and the slope of such seams and joints.

If the stability of adjoining buildings or walls is endangered by excavations, shoring, bracing, or underpinning shall be provided as necessary to insure their safety. Such shoring, bracing, or underpinning shall be inspected daily or more often, as conditions warrant, by a competent person and the protection effectively maintained.

If it is necessary to place or operate power shovels, derricks, trucks, materials, or other heavy objects on a level above and near an excavation, the side of the excavation shall be sheet-piled, shored, and braced as necessary to resist the extra pressure due to such superimposed loads.

If possible, dust conditions shall be kept to a minimum by the use of water, salt, calcium chloride, oil, or other means.

3. Excavations: Excavation shall be made to the lines and grades and forms shown by the drawings or ordered by the Engineer and shall be performed so that daily operation of the existing treatment plant is not affected.

The Contractor shall conduct his operations in such a manner as to safeguard all utilities encountered in the excavation, such as existing gas lines, water lines, sewers and telephone lines on or under the surface. The Contractor shall also conduct operations under this Contract in accordance with the regulations of the Federal, State, Municipal, Public and Private Agencies having jurisdiction over such matters as to maintenance of foot and vehicular traffic, storage of material, finished grading, and the maintenance of uninterrupted service of utilities, industry and drainage facilities.

Bidders shall satisfy themselves by personal examination of the location of the proposed work and by such means as they may choose as to the actual conditions and requirements of the work, to enable them to make their bids intelligently and to advantage.

The information contained in these Specifications and shown on the Contract Drawings of existing structures, utilities and/or other features has been taken from the best available sources. Canton Drop Forge expressly states that it does not guarantee the accuracy of this information and that the various utility lines, etc., may run materially different from the indications as shown on the drawings. No allowance will be made for any claims that bids were placed upon incomplete information as to the nature and character of the site involved and for material of unexpected character found in excavation.

DETAILED SPECIFICATIONS

4. Trench Excavation: Trenches in all classes of materials, shall, during the progress of the work, be excavated to the required depth and width for a distance of at least ten feet (10') in advance of the ends of sewer or pipe in place. The bottom of the trench shall be finished by hand excavation to provide continuous and uniform bearing for the bottom one-third (1/3) of the pipe barrel.

The trench for sewers or drains for pipes laid in concrete, and for other structures shall be as wide as the greatest external horizontal width of the structures to be laid therein and shall have vertical sides. Undercutting the sides of excavation will not be permitted.

During the progress of the work, no more than 200 feet of trench shall be opened or partly opened at any one time in advance of the completed pipe line, unless permitted by written orders from the Engineer. Such orders shall not release the Contractor in any way from his responsibility. All such open excavation shall be adequately barricaded and furnished with sufficient protection devices to eliminate hazardous conditions.

5. Rights-of-Way Excavation: Excavation on rights-of-way or private property shall be performed with care so as to avoid injury to the property. All sod, shrubbery, fences, etc., shall be carefully protected or removed and stored, and after the trench has been properly backfilled and a reasonable time has been allowed for settlement, the sod, shrubbery, fences or other similar structures shall be replaced in their original location and condition. This shall be paid for under Item No. 2, "Clearing and Grubbing" and Item No. 16, "Grading, Mulching, Seeding and Clean-Up" of these Specifications.

6. Maintenance of Excavation: All excavations shall be maintained in good condition during construction so as not to hinder or injure adjacent structures, pipe lines or other work, and all necessary precautions shall be taken to prevent movement of the sides of excavations performed under this Contract.

The sides slopes shall be such that the material will not cave or slide into the bottom, and any material sliding down at any time before the completion of the work shall be removed by the Contractor without additional compensation. Wherever masonry is to be built directly against the sides or bottom of the excavation, the Contractor shall take such precautions as will preserve the surfaces in good condition. The final trimming of the bottom and sides of excavation against which masonry or pipes are to be built shall be done just before the concrete or pipes are placed.

7. Unsuitable Foundation: In case the material encountered at any point is not, in the opinion of the Engineer, suitable foundation, the excavation shall be carried to such additional depths as the Engineer may order. No payment for

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such additional excavation up to one foot below plan elevation shall be made. Where, in the opinion of the Engineer, it is necessary to refill such authorized excavation with gravel or stone, payment for such material shall be made under Item No. 11, "Ballast for Foundation and Drainage."

In case the foundation is in rock, the excavation shall be carried to an additional depth of eight inches (8") and the space below grade filled with select material obtained from earth excavation under this item, or with material to be furnished under Item No. 11, "Ballast for Foundation and Drainage" as permitted by the Engineer.

8. Unauthorized Excavation: In case the excavation at any point is carried below the grades or beyond the lines given, and is due to the Contractor's method of construction, the Contractor shall at his expense, refill such unauthorized depth with gravel or crushed stone thoroughly tamped in layers not to exceed four inches (4"), or with concrete, as directed, in an approved manner. In case the bottom of the excavation on which a concrete foundation is to be placed is loosened or cut into in any manner, the Contractor shall remove all such loosened material and refill to the elevation of the bottom of the foundation as shown on the Contract Plans, with concrete or other material, as approved, and at his expense.
9. ~~Drainage and Protection of Work:~~ The Contractor shall pump or otherwise remove any water which may be encountered or shall accumulate in the excavation; shall build all necessary bulkhead work, temporary drainage piping, and in general do all protective work needed during the progress of construction. He shall have at all times upon the work sufficient plant and pumping machinery, in good operating condition ready for immediate use to remove all ground and surface water sufficiently so that the structure or sewers will be laid on a dry foundation and will not in the opinion of the Engineer, be affected by the infiltration of water.

The Contractor shall, during the progress of the work, provide connecting drains, sumps, drainage pipes, pumping equipment, and other facilities required to remove surface water which may come on or into the streets or alleys or rights-of-way upon which work is being performed under this Contract. All such drainage equipment shall be built, provided for and operated by the Contractor, and the water shall be pumped as far as necessary. All such water removing equipment shall be of ample capacity, and shall be kept in good operating condition until, in the opinion of the Engineer, these water removing devices and equipment will no longer be necessary. Drainage from trenches shall not be discharged to water of the State without treatment in sedimentation basins.

The cost of diverting surface and ground water from the trenches shall be included in this item. The cost of transporting water to erosion and

DETAILED SPECIFICATIONS

sedimentation control facilities and the cost of such facilities shall be included and paid for under Item No. 17, "Erosion and Sedimentation Control Facilities".

The Contractor's plan of dewatering trenches in wet and/or soft foundations shall be such as not to permit water to flow over or soften the surfaces upon which pipe and structure are to be built. If necessary, the method of well points shall be used. The cost of installation and operation of the equipment shall be included under these items.

10. Protection of Utilities, Private and Public Property: The Contractor shall take every precaution to prevent injury or breakage to all existing structures, gas mains, electric conduits, sewers, drains, water lines, poles, and all other surface and subsurface structures, under, over or along side of which the sewers will be located, and in case of injury they shall be restored by him without compensation therefor, in as good condition as that in which they were found. The Contractor shall submit his method of procedure of this work to the Engineer for approval, but such approval shall not relieve the Contractor from liability for any damages.

When gas or water mains or service lines, telephone conduits, supporting poles for electric power lines, street lights, or telephone lines require removal or relocation, or become unavoidably broken, disconnected, destroyed, or removed, the Contractor shall immediately advise the Engineer, and shall immediately notify the proper public utility company or its representative and the owner, so that such required removal, relocation or repairs may be completed. All repairs to private or public property or of any utility occasioned by carelessness of the Contractor or unnecessary or wanton destruction shall be made at the expense of the Contractor.

When water mains or service lines are broken, disconnected, destroyed or removed, or leaks develop, occasioned by work under this Contract, the Contractor shall immediately make or arrange for repairs to be made and shall restore service at his expense and at no cost to the owner.

Where facilities of public utility companies require removal or relocation, the Contractor shall give sufficient advance notice to the Engineer to permit arrangements to be made for the removal or relocation of such facilities in order to prevent any delay in the work.

The Contractor shall plan his work in such a manner on streets and thoroughfares that traffic and access to properties may be maintained at all times.

11. Maintenance and Restoration of Walks, Curbs, Sewers, Drains and Pavement: The Contractor shall construct such temporary bridging over

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trenches in roads, streets, alleys, driveways and parking lots as required to afford owners and business establishments access to their properties; and he shall maintain all walks and driveways in a safe condition for foot and vehicular traffic at all times during the construction period. No additional compensation will be allowed for temporary repavement or bridging.

Upon completion of construction of the sewers and structures, all temporary structures shall be removed and the curbs, walks and pavements restored to a condition as good as that in which they were found at the start of the work. Replacement of concrete and bituminous pavements shall be included and paid for under other items.

12. Sheeting, Shoring and Bracing: Excavations shall be properly and securely shored in accordance with regulations of the Federal Department of Labor such as the Occupational Safety and Health Act of 1970, as amended and to the satisfaction of the Engineer, and where ordered, close timber sheeting or sheet steel piling shall be driven in advance of the excavation. The sheeting shall be driven to such depths as required, and shall be made in all particulars satisfactory to the Engineer. In addition, the Contractor shall take such other precautions that might be necessary to prevent any damage to private or public property by reason of the construction. The Contractor shall be responsible for any damage to public or private property due to the failure or insufficiency of the sheeting and shoring.

All sheeting and shoring not ordered left in place by the Engineer shall be removed during backfilling and before backfilling is completed, in such a manner that will prevent caving in and permit proper compacting of the fill. Upon removal, all voids shall be carefully filled and rammed with suitable tools.

Lumber for foundations, sheeting, and shoring shall be merchantable grade, sawed, structural grade Yellow Pine or Oregon Fir, straight, sound, free from shakes, large, loose and decayed knots, wormholes or other imperfections that may impair its strength or durability. Sheet steel piling shall be of the standard size and weight for the required depth.

All shoring and sheeting shall be placed in such a manner as not to interfere with the installation of pipes or structures.

All shoring and sheeting shall be placed at the earliest possible time to prevent surface cracks in the earth and structures adjacent to the excavations. The cost of shoring and sheeting shall be included in the unit prices bid under these items. The cost of repairing structures damaged in the process of excavation shall be borne by the Contractor under these items.

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Portable trench boxes or sliding trench shields may be used for the protection of personnel in lieu of a shoring system of sloping. Where such trench boxes or shields are used, they shall be designed, constructed, and maintained in manner which will provide protection equal to or greater than the sheeting or shoring required for the trench.

13. Contractor not Relieved of any Responsibility: The neglect, failure or refusal of the Engineer to order the use of sheeting, or steel piling, or better quality, or large sizes of timber, or to order sheeting, sheet piling, bracing, shores, etc., to be left in place, or the giving or the failure to give any orders or directions as to the manner and methods of driving or placing of sheeting, bracing, shores, etc., shall not in any way or to any extent, relieve the Contractor of any or all of his obligations under this Contract.

14. Tunneling and Boring: In general, no tunneling or boring will be allowed except by written permission of the Engineer after approval of the Contractor's method of installation and backfill. Where tunneling or boring is permitted, the Contractor shall be responsible for any damages which this method of excavation may cause to pavements, curbs, drains, property or structures.

The tunneling work shall be timbered, sheeted, and shored, and shall at all times be subject to the directions given by the Engineer in the field. All timbering, sheeting and shoring shall be left in place and the entire tunnel filled with granulated slag or with concrete. No extra compensation will be allowed for tunneling or for any labor or materials in connection therewith.

Boring and jacking of pipe in private right-of-way and under pavement, if permitted, shall also be done in such a manner as to permit installation of the sewer at the grade specified. No extra compensation will be allowed for boring and jacking pipe or for any labor, encasement pipe or other materials in connection therewith.

15. Storage of Materials on Streets and Highways: During the progress of the work, the Contractor shall store the excavated materials, and materials of construction along the line of the work, in such place or places as the Engineer shall approve and in conformance with the requirements herein below specified.

The materials shall be so stored that traveled roadways shall be open for at least two lanes of traffic, and so that a continuous walkway, at least three feet in width in the clear, shall be provided on one side of the road. In all cases valve boxes on gas and water lines, hydrants, sewer manholes, or other facilities of public utilities shall be kept accessible. The Contractor shall provide access to any public or private property. Free passage for surface

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water shall be maintained in the gutter of all streets and roadways upon which work is in progress.

The Contractor shall keep himself advised concerning the regulations of all State, County, Private and other agencies having jurisdiction over roads and streets and shall conform to the requirements of those agencies in reference to vehicular and pedestrian traffic and drainage, and protection of materials and excavation stored along the roadway.

16. Backfilling: The material for backfilling shall be clean loam, gravel, or sand, obtained from excavation and shall be free from large stones and all perishable matter which would prevent proper consolidation or cause after-settlement.

Select earth shall be used around and over all pipe and structures to an elevation at least one (1) foot above the top of the pipe or foundation. Extreme care shall be taken that the material is placed evenly under and around sides of the pipe lines and structures in such a manner as to prevent any pushing or movement laterally in any method. The upper 18 inches of the trench in traffic locations where surface settlement is important shall be backfilled in the same manner so indicated for the bottom section carrying one (1) foot above the top of the pipe. The refill material for the remaining portion of the trench may contain not more than 30 percent rock or stone not larger than 8 inches in the greatest dimension. Where such refill is used, the voids between the pieces shall be filled and properly tamped.

After the completion of a section of the pipe line and structures, allowing for all inspection and tests, the refill material shall be deposited in the excavation in layers not over four (4) inches thick for the first 12 inches over the top of the pipe or foundation and six (6) inches thick thereafter. The material shall be placed evenly and simultaneously on both sides of the structure to avoid unbalanced loads and shall be compacted thoroughly with suitable tools. Where necessary to secure proper compaction, the materials may be moistened. The amount of water which may be added to the material shall be such that the optimum moisture point of the material shall not be exceeded. All excavation shall be backfilled by the use of mechanical tampers.

In general, mechanical tamping shall be required for all backfilling. The mechanical tamping shall be performed during the placing of the backfill with a rammer capable of striking 550 blows per minute at a pressure of 90 pounds per square inch. The force of each blow shall be at least 65-foot pounds.

Where the use of mechanical tampers is impractical for any reason, backfilling shall be placed in layers not more than four (4) inches in depth,

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thoroughly compacted with rammers having bases not in excess of thirty-six (36) square inches and weighing not less than twenty (20) pounds. Where such equipment is employed, there shall be two men tamping for each man shoveling backfill materials.

No backfilling shall be done with frozen material or in freezing weather. All coarse and lumpy earth shall be pulverized before being placed in backfill. No rock fragments larger than eight (8) inches in the largest dimension shall be placed in the backfill, and where such backfill is permitted, the spaces between the pieces shall be well filled with earth and tamped. No rock fragments shall bear directly against any pipe or structure.

17. Road and Street Surfaces: The Contractor shall repair and replace all roadway and street surfaces, damaged from any cause whatsoever by reason of the work under this Contract. The entire width of the road or street shall be left in as good condition as before excavation was started, and shall be satisfactory in all respects to the Engineer. Payment for removal and replacement of hard surfaced roads and streets will be made under other items of this Contract.

18. Disposal of Surplus Materials: Where the work under this Contract is done on or along streets or highway, the Contractor shall, during the progress of the work, clean the roadway surfaces, remove surplus materials and flush gutters up to a point within two hundred (200) feet of the end of the finished work.

The Contractor shall, immediately upon completion of backfilling, remove or dispose of all rubbish and surplus excavation, all temporary structures, and all surplus materials brought to or used in the work. The surplus excavation shall be deposited by the Contractor at the point or points designated, at his expense. Where the work is upon easement, the Contractor shall clean up the surface of the ground and restore it to its original condition, supplying such materials, as are necessary at his expense. The beds of all creeks and water courses shall be graded and restored to their original condition and all obstructions removed therefrom.

19. Grading: The ground around completed structures, and adjacent areas within the limits of grading shown on the plans, and all fills, spoil banks, and embankments shall be rough graded to the elevations as shown or as may be directed. All surfaces shall be left even, smooth, and free from sticks, stones and rubbish.

Certain exploratory excavations to determine location and depth of existing utilities may be required to be performed by the Contractor at various locations prior to and during the progress of work under this Contract.

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Payment for this excavation shall be included under these items of the Contract.

20. **Blasting; General:** There shall be no blasting unless written permission has been secured from the Engineer. When permitted, blasting shall be conducted so as not to endanger persons, structures and/or property, and the Contractor shall be held responsible for and shall make good any damage caused thereby. He shall comply with all regulations, laws and ordinances governing this class of work. The Contractor, before firing a blast, shall cover the area adjacent the charge carefully with heavy timber, mats or other material to prevent stone from flying. No blasting shall be done within 25 feet of completed structures.

No blasting will be permitted until the Contractor has furnished the Engineer and the Owner with proof that his insurance coverage includes personal liability and property damage to surface and subsurface structures as indicated in the applicable claims of the Contract Provisions.

However, if no alternative is found except to blast, the total charges shall be very small and blasting mats should be used to cover the specific blast areas. Also, seismograph monitoring shall be performed at several points around the blasting operations.

If blasting is performed at this site for breaking of the rock, the maximum amount of total charge used for each blast should be less than 1.5 pounds of dynamite or comparable explosive material that provides the same charge as 1.5 pounds of dynamite. The rock where the blast is occurring shall be covered and protected with blasting mats. Also, the blasting shall be carefully monitored with seismograph equipment placed about 200.0 feet from the blast or adjacent to a structure near the blast. The maximum peak particle velocity recorded for this blasting at 200.0 feet away shall be less than 1.0 inch per second. The amount of charge to be utilized shall be predetermined by the Contractor based upon his years of experience in this field. Any trial and error method of determining the amount of charge shall only be performed with extreme caution so as not to damage the existing structures.

21. **Storing of Explosives:** The Contractor shall provide separate fireproof receptacles, plainly marked with three-inch letters, "EXPLOSIVE -- DANGER", for blasting powder and dynamite, fuses and caps. Storing of blasting powder, dynamite, fuses and caps in a tool box will not be permitted. Explosives shall be handled with great care, and shall be at all times in charge of a competent watchman.

22. **Embankment Construction:** Embankment construction shall consist of preparation of the areas upon which embankments are to be placed; the

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placing and compacting of approved materials within the structure and roadway areas where unsuitable material has been removed; and the placing and compacting of embankment material in holes, pits and other depressions within the construction area. Only approved materials shall be used in the construction of embankments and backfills. Frozen material shall not be placed in the embankment nor shall embankment be placed on frozen material.

Embankment methods, moisture and density control, and compaction shall conform to Item 203, "Roadway Excavation and Embankment" of the State of Ohio, Department of Transportation, "Construction and Material Specifications" dated January 1, 1995.

23. Compensation: The payment for all work under this item shall be at the Contract lump sum price as bid therefor, for Item No. 3, which is full compensation for all labor, materials, and equipment as herein specified.

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BALLAST FOR FOUNDATIONS AND PIPING

Item No. 11

1. Work Included: The work under this item shall include all labor, materials, and equipment necessary for furnishing in place all ballast for cushioning sewer pipe in rock excavation, for fill in replacing soft or unsuitable foundations, or for other uses as may be directed by the Engineer.
2. Materials: Pipe ballast may be screened gravel, crushed limestone or crushed top rock. It shall be clean, hard, well rounded and free from dirt and other foreign materials. The maximum size to be used is 3/4 inch and shall be graded that 95% will pass 3/4 inch square openings and 95% retained on No. 4 sieve. This gradation meets the requirements of SP No. 67 set forth in U.S. Department of Commerce - Simplified Practice Recommendation R 163 or ASTM Designation C-33. Ballast for replacement of soft and unsuitable foundation material shall be gravel of the nominal 1-1/2" graded aggregate as heretofore specified for Section 03300 "Cast-In-Place Concrete", unless otherwise shown on the Contract drawing or required by the Engineer.
3. Placing: When ballast is to be stored before placing, it shall be stored in such a manner as to keep it free from mud or other foreign material which may make it unfit for its intended use. If, during construction, the drainage ballast become clogged, thus destroying its usefulness, it shall be removed and replaced at the Contractor's expense.

Where concrete is to be placed over the ballast, a covering of heavy tar paper or other waterproof paper shall be laid over the ballast to prohibit concrete from entering the stone bed. This paper shall lap at least six inches beyond the edge of the stone, and adjacent strips shall have minimum laps of six inches. Paper and placing shall be included and paid for under the unit price bid for this item.

Where ballast is required in trenches, it shall be placed in the bottom of the trench to the depth shown on the Contract Plans or as ordered by the Engineer and shall be compacted thoroughly to provide a firm foundation for the sewer pipe. The ballast cushion shall be not less than eight (8) inches in thickness.

4. Measurement: The quantity of material to be paid for under this item shall be the actual cubical contents of the ballast in place within the lines and the grades shown on Contract Plans or as ordered by the Engineer. No payment will be made for materials placed beyond the specified limiting lines.

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5. Compensation: The payment for all work under this item shall be the unit price per cubic yard as bid therefor, which is full compensation for all labor, materials and equipment, as herein specified.

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GRADING MULCHING, SEEDING AND CLEAN-UP

Item No. 16

1. Work Included: The work under this item shall include all labor, materials and equipment necessary for the finish grading, topsoiling, fertilizing, mulching, planting, landscaping, cleaning-up and all incidentals necessary to restore to the original condition all surfaces such as lawns, unimproved streets, alleys, driveways and sidewalks not included in other items of this Contract.

The limits of work for this item shall include all areas within the construction site, borrow pits, restoration of temporary erosion control facilities, entrance road and any other areas disturbed as a result of construction activities necessary for the execution of this Project.

2. Work Not Included: The requirements for clearing and grubbing, unclassified excavation, rough grading and similar preliminary work shall be paid for and as specified in previous items of these Specifications.
3. Finish Grading: Areas requiring topsoil shall be graded to within four (4) inches of the finished grade. The soil shall be loosened by discing or scarifying to a minimum depth of two (2) inches to ensure proper bonding of the topsoil.

Areas not requiring topsoil shall be graded to the finished grade as shown on the Contract Drawings or as directed by the Engineer. These areas shall be smooth, even, free of all deleterious material and stones exceeding two inches approximately in any dimension and ready for planting.

Seedbed preparation shall not be necessary on slopes greater than 3 to 1.

4. Topsoil: Topsoil shall be furnished and spread in required areas to a minimum depth of five (5) inches unless otherwise specified. Stockpiles topsoil from Item 3 shall be used where possible. In the event that stockpiling is not satisfactory or is inadequate to cover the required area, the Contractor shall furnish satisfactory topsoil at his own expense. After spreading the soil, all deleterious material and stones exceeding two (2) inches approximately in any dimension shall be raked up and removed from the site. The soil shall be uniformly compacted with a light hand roller to a final depth of four (4) inches. Any irregularities shall be corrected before the fertilizer and seed are placed.
5. Fertilizer and Liming: The fertilizer shall be complete, partially organic, commercial 12-12-12 or its equivalent, dry or wet. The fertilizer shall be uniformly spread in lawn areas at a rate of 20 pounds per 1000 square feet. The fertilizer shall then be lightly raked into not less than 2 inches of topsoil to

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prepare the seedbed. Other commercial fertilizers and liming may be used if approved by the Engineer or determined by soil test.

6. Seeding: Immediately following area preparation, seed shall be sown. Legume seed shall be inoculated with approved cultures, in accordance with the instruction of the manufacturer. When using a hydroseeder, the inoculate shall be increased to five times the normal rate.

Seed shall be sown by approved methods which provide for uniform distribution of seed. Rates of application and type of seed moisture shall be in accordance with the Ohio Department of Transportation, Item 659 of the "Construction and Material Specifications" dated January 1, 1995.

All sloped areas with steeper grades than 2 to 1 shall be seeded with Crown Vetch as per Ohio Department of Transportation, Item 659.

All other areas shall be considered urban in character. The seedbed shall be prepared as previously specified. After sowing the area shall be lightly brushed or raked to provide a slight covering over the seed then lightly rolled. The area shall be kept moist until the seed germinates as per Item 659.

It is recommended that permanent seeding be performed between the dates of March 1 to June 15 and August 1 to October 15.

7. Maintenance: Maintenance of seeded and planted areas shall include watering during dry periods, reseeding, repairs and replacements during the planting season. The Contractor shall insure a good final stand of grass and areas which do not show a prompt catch of grass shall be reseeded as required. Maintenance of seeded areas shall be for one year after acceptance of the project.
8. Mulching: The Contractor shall protect and maintain seeded areas to assure a full even stand of grass. Critical areas requiring stabilization or to insure proper germination shall be mulched at the Contractor's expense with approved mulching material. Upon completion of the contract, the Contractor is required to show all seeded areas uniformly germinated and should remove all excess mulch.

Mulching material shall be free of mature seed bearing stocks or roots and prohibited or noxious weeds, and composed of hay, straw, wood cellulose or other approved material. Mulch shall be anchored with twine, stakes, paper or plastic nets, or other approved methods, where required.

9. Planting and Replacement: The Contractor shall furnish and plant or install all trees, shrubs, fences, mailboxes, sign posts and the like to restore the area to its original condition. Where plantings are required, they shall be

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supplied by the Contractor from items removed during "Clearing and Grubbing" or from nursery stock of size and quality complying with the American Association of Nurserymen. Plants shall be installed in accordance with recommendations of local nurserymen.

10. Landscaping: Plant materials shall conform at all times to the requirements hereinafter given. No inspection of plant materials shall act to change or modify any of these requirements in any way.

Quantities: The Contractor shall furnish quantities necessary to complete the planting as shown and located on the grading plan.

Quality: All plants shall be true to type and name and typical of their species or variety; they shall have normal, well developed branch systems and vigorous, fibrous root systems; they shall be sound, healthy, vigorous plants, free from defects, disfiguring knots, sun scald injuries, abrasions of the bark, plant diseases, insect eggs, borers, and all forms of infestation.

All plants shall be nursery grown unless otherwise stated; they shall have grown under similar climatic conditions as the location of this project for at least two (2) years prior to the date of this contract. All plants freshly dug; no heeled in plants and no plants from cold storage will be accepted.

Shrubs: Shrubs can be well branched and have ample, well balanced root systems capable of sustaining vigorous growth.

Planting Season: Planting shall be executed according to the following schedule: March 15 through May 15, and August 15 through November 15. These periods may be extended or restricted according to the prevailing weather conditions at the time and at the discretion of the Engineer. All ground cover shall be spring planted unless otherwise specified.

Shrub Pits: All shrubs shall be planted in individual pits. Shrubs B & B shall be planted in pits at least one (1) foot greater in diameter than the ball of earth. Pits for bare rooted shrubs shall be eighteen (18) inches greater than the spread of the roots and at least fifteen (15) inches deep.

11. Clean-Up: The Contractor shall frequently remove all refuse, rubbish, scrap, or debris caused by his operations so that the project area shall be left in a neat, sightly condition.

Clean-up shall be performed during construction as required to prevent accident to personnel, and to effect completion of the project in an orderly manner.

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Final clean-up shall be performed prior to final inspection and approval. The Contractor shall restore the project site to a condition satisfactory to the Owner and Engineer. Clean-up shall consist of removing all rubbish, debris, equipment, etc., and restoring all disturbed areas and pavements to a clean, orderly condition equal to that which existed prior to construction. Maintenance shall be for twelve months after acceptance of the project.

12. Price Breakdown: The Contractor shall provide to the Engineer the unit price breakdown of all the components of this lump sum item used in determining the bid price.
13. Compensation: The payment for all work under this item shall be at the lump sum price, as bid therefor for Item No. 16, which is full compensation for all labor, material and equipment as herein specified.

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EROSION AND SEDIMENTATION CONTROL FACILITIES

Item No. 17

1. Work included: The work under this item shall include all labor, materials and equipment necessary for the construction and removal upon completion of all temporary erosion and sedimentation control facilities as shown on the Contract Drawings described in these Specifications, required by the Engineer or other regulatory agencies or necessary to complete the work.

Control measures shall be implemented under this Contract during construction and proper restoration provided at the completion of the project. All control facilities shall be temporary and exist only for the duration of the project. There are no changes anticipated to the land surface or vegetative cover.

This item shall include the cost of all work involved in construction and removal of soil erosion and sedimentation control facilities. Also included shall be the removal of sediment as required and the cost of transporting ground and surface water to the control facilities.

2. Control Measures: The Contractor, under this item and all other appropriate items of this Contract, shall carry out the following measures to control erosion and sedimentation in the entire area of construction.
 - a. Clearing and grading shall not be started until a firm construction schedule is known and can be effectively coordinated with the grading and clearing activity.
 - b. Earth moving activities will be staged to minimize erosion problems. As previously stated, only 200 feet of trench will be opened at any one time. Material placed in the trench will be compacted and, if possible, sod replaced to prevent erosion. If sod is not available, the area shall be final graded, seeded and mulched as required by the Engineer.
 - c. Disturb only the areas needed for construction. Natural vegetation covering the area shall be disturbed as little as possible.
 - d. Only trees, shrubs and grasses that must be removed for construction shall be removed; the others shall be preserved for aesthetic and erosion control values.
 - e. Topsoil stockpiles for any length of time shall be anchored with much and/or seeded, as previously specified.

DETAILED SPECIFICATIONS

- f. In some instances it will be necessary to pump water from trenches and excavations during construction. Water pumped from trenches and excavations will be pumped into a sedimentation basin if necessary to avoid excessive siltation of waterways or damage to adjacent properties. All sedimentation basins will be carefully removed after use.
 - g. Sediment barriers shall be used at storm drain inlets, across minor swales and ditches, and at other locations where necessary. Sediment barriers shall be constructed of hay or straw bales, securely anchored, to retain sediment by filtering runoff.
 - h. Diversion terraces are to be used as a temporary measure installed on the uphill side of the disturbed area to divert surface runoff away from unstabilized slopes.
 - i. Interceptor channels are to be used across disturbed areas where the slope is running parallel to the direction of the sewer line.
 - j. The excavation for stream crossings should take place at low flow. The method used to control erosion when crossing a stream will be dependent upon conditions of the particular site. Baled hay or straw barriers shall be installed downstream to filter sediment. In smaller streams, the flow may be temporarily dammed. When excessive sediment is produced behind a sediment barrier, it may be necessary to pump water into a sedimentation basin and gradually allowed to flow back into the stream.
 - k. Only construction equipment necessary to install a sewer under the stream bed will be permitted to cross the stream. This may necessitate the construction of temporary culvert stream crossings or other facilities to avoid excessive disturbance of the stream bed.
 - l. Roadways and parking lots shall be paved or otherwise stabilized as soon as feasible.
3. Site Conditions: Bidders shall satisfy themselves by personal examination of the location of the proposed work and by such means as they may choose as to the actual conditions and requirements of the work, to enable them to make their bids intelligently and to advantage. No allowance will be made as to the nature and character of the site of the work involved or for material of an unexpected character found in excavation.
4. Responsibility: In case of repeated failure on the part of the Contractor to control erosion, pollution, or siltation, the Engineer reserves the right to employ outside assistance to provide the necessary corrective measures.

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Such incurred direct costs will be charged to the Contractor and deductions made from the Contractor's monthly progress estimate.

5. Restoration: After all construction work is completed, the Contractor shall remove all structures, remove sediment and embankments, and generally restore the area, as practicable, to that which existed before construction. "Final Grading, Mulching, Seeding and Clean-Up" shall be paid for and as specified under Item 16 of these Specifications.
6. Price Breakdown: The Contractor shall provide to the Engineer the unit price breakdown of all the components of this lump sum item used in determining the bid price.
7. Compensation: The payment for all work under this item shall be the lump sum price as bid therefore for Item No. 17, which is full compensation for all labor, materials and equipment as herein specified.

**OIL/WATER SEPARATION
DESIGN REPORT**

CDF005620



**Oil/Water Separation Design Report
October 1994**

Prepared For:

**Mr. Keith Houseknecht
Canton Drop Forge**

RECEIVED

FEB 8 1995

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DRAWINGS

Plate 1	Westend Site Plan And Yard Pipe
Plate 2	Eastend Site Plan And Yard Pipe
Plate 3	Survey Plat Plan
Plate 4	Proposed Oily Process Wastewater And Steam Flow Diagram
Plate 5	Westend Existing Site Plan Detail

1.0 INTRODUCTION

The Canton Drop Forge Company operates a facility at 4275 Southway Street SW, Canton, Ohio for the production of forgings from special alloys.

Facilities include thirteen steam hammers of which any one to five may operate at any one time. A 14-inch high pressure (150 psig) steam manifold distributes operating steam to the hammers. To lubricate the cylinders of the forging hammers, oil is atomized into the steam prior to the steam entering the press valving.

The steam leaves the forging hammers as "Low Pressure Steam" (6-8 psig) and is collected in a 16-inch steam/condensate manifold. The majority of the low pressure steam passes through a horizontal oil separator drum, and is discharged vertically into the atmosphere. The oil/condensate mixture which separates from the steam in the separator drum discharges to Pond No. 1-2

A portion of the low pressure steam is piped to the hot process softener in Boiler House Building E. After this process, the steam is exhausted to the atmosphere, and the condensate drained to a manhole which discharges to Pond No. 2. Another portion of the low pressure steam is used to heat the Anvils, and the condensate drains to a sump and is pumped to Pond No. 2.

There are three ponds on the site which in addition to the oil/condensates, as indicated above, receives flushing water, water from roof drains and surface drainage.

Effluent from Pond No. 2 is pumped to Pond No. 3. There are no discharges from either Pond No. 1 nor Pond No. 3.

Canton Drop Forge retained FBA Environmental, Inc. to investigate their operations, and review treatment technologies which more efficiently would separate and collect the oil from the process wastewaters discharging to the ponds, reduce the oil discharging via the steam discharged to the atmosphere, and recommend closure procedures for Pond No. 1.

Canton Drop Forge also wanted FBA Environmental to perform a survey of the plant facilities to improve their existing yard drawings by establishing ~~contour lines,~~ ~~locate equipment, buildings, drainage and sewer lines, manholes etc.~~

2.0 STATEMENT OF OBJECTIVES

This investigation of the Canton Drop Forge process wastewater and steam condensate recovery systems is preliminary, to the extent necessary to identify practical, cost effective approaches to address the objectives identified above. This investigation focused on identifying and locating oily process and condensate wastewater lines, and obtaining estimates of the wastewater flow rates to formulate alternative solutions for consideration by Canton Drop Forge.

In the effort to reduce the oil escaping to the ponds, and thus improve the overall wastewater quality, and to improve the quality of the yard drawings, this investigation included the following major efforts:

- Review of existing laboratory analysis, engineering studies, and drawings. Canton Drop Forge provided pertinent available plant drawings, previous study reports, and plant operational data. Review of this information enabled development of a field investigation program designed to complement the

available data.

- Field investigation to identify oily process and condensate wastewaters through interviews with operating personnel and a general system inspection. This effort had the objective of more specifically identifying system operation, problems and ascertaining wants and needs of Canton Drop Forge in this regard. The field investigation focused on walking the plant site to physically locate the process lines which would discharge to the treatment facilities, and to establish possible locations of the proposed treatment facilities. The field investigation provided sufficient system characterization information to develop practical alternative technologies for attaining improved discharge wastewater and steam quality.
 - Field survey to provide additional detail of contour lines and actual physical location of plant facilities.
 - Review and identification of practical alternative technologies which might be applied to the Canton Drop Forge process. The focus of this review was to define equipment suitable for reducing oily discharges to the ponds, and in the steam discharges to the atmosphere.
 - Development of relative costs associated with each individual option. The cost estimates included in this report are of a quality detailed enough for determining capital appropriations as well as serving, for the basis given in this report, the Design-Build proposal from Bowen Engineering Corporation (FBA Environmental, Inc's Design-Build partner).
- Should Canton Drop Forge wish to pursue a Design-Build arrangement with

Bowen Engineering Corporation, and some modifications are required or desired, Bowen Engineering Corporation reserves the right to review the impact on these proposal costs.

3.0 FIELD STUDY - INFORMATION GATHERING

FBA Environmental performed a field study of Canton Drop Forge's operations through several visits to the plant. The oily process wastewater and the steam/condensate system lines were identified and physically located. The basis for flow rates was established and possible physical locations for the treatment facilities identified.

To establish additional detail for the existing yard drawings, a field survey to 1) improve the contouring detail, and to 2) show location of physical facilities, was conducted on June 18, 1994 and July 18, 1994.

4.0 ALTERNATIVES EVALUATIONS

4.1 Oil/Water Separation System

4.1.1 Site Information and Existing Facilities

The existing site comprise approximately 31 acres along the north side of Southway St. Currently the surface drainage is collected in three ponds, designated as Pond No. 1, 2 and 3. The project site has several storm drains which in addition to the oily process and condensate waters, receives flushing water, roof drains, and surface drainage prior to discharging into the three ponds.

Pond No. 1 receives runoff and process wastewaters through four drains in the area. Three are approximately six to eight feet below the surrounding surface while one is approximately eighteen feet below grade. Pond No. 2 receives runoff and oily

Pond No. 1
Effluent

condensates from three pipes at approximately five to nine foot deep. Pond No. 3 receives runoff from the surrounding area and effluent from Pond No. 2.

4.1.2 Oily Process Wastewaters and Condensates

Oily process wastewater collected in the Forge Building exits the Forge Building on the west side (2 lines) and on the south side (1 line) and discharges to Pond No. 1. The total flowrate of the three lines is approximately 60 gallons per minute (gpm), and it was agreed with Canton Drop Forge personnel to use a design flowrate of 120 gpm.

Oily condensates from the Main Steam Separator in the north end of the Forge Building and from the Hot Softener Process in the Boiler House enters the storm drainage system at the north-east side of the Forge Building and the south-east side of the Boiler House respectively, and then discharges to Pond No. 2. It was agreed with Canton Drop Forge personnel to use the following design rates for the main steam condensate: 25 gpm, the Hot Softener condensate: 10 gpm, and the Anvil water: 10 gpm.

4.1.3 Scope of Oil/Water Separation Improvement

Reducing the oil content in oily wastewater can be achieved with a number of processes. These include gravity separation, coalescing, flotation, and chemical and physical treatment. Parameters should consider maximum and minimum flow rates, the type and condition of the oil. Specific gravity and viscosity affect the equipment selection and the sizing criteria. The pH and temperature are other parameters that also have an impact on the selection/sizing process.

In reviewing the process at Canton Drop Forge, the flow rates and the physical location of equipment and sewer lines, it was decided that gravity oil/water separators

Normal should be straining to 2
Uses Pans No. 1 as backup via gravity.

↳ THE LONE

→ Double bond in
then a new

↓
Doubt

↓
Doubt

↓
Doubt

three wastewaters. In this case, the Hot Softener steam condensate needs to be piped and the Anvil water to be pumped (positive displacement pumps) to the main steam separator location. The other is to use two separators; one at the main separator to treat the main separator condensates and one in the Boiler House basement to treat the Anvil water and the Hot Softener condensate. In this case, the piping run for the Hot Softener condensate is shorter and the Anvil water does not need to be pumped to the separator. The effluent from this gravity separator discharges to an existing sump system in the Boiler House basement and is pumped to Pond No. 2 via existing drainage facilities.

The following options were reviewed:

BASE: Install single separator in the "yard", and a single separator in the area of the main steam separator, as indicated above and in drawings Plate 1 and Plat 4.

OPTION B1: Install single separator in the "yard" and install two separators; one in the main steam separator area and one in the basement of the Boiler House.

4.1.5 Surface Runoff

Originally, the scope of this project was to include the estimation and treatment of contaminated runoff. This was later deleted by Canton Drop Forge management. However, since some effort had been invested in establishing runoff rates, FBA Environmental is providing the information below.

Runoff from approximately six (6) acres at the west end of the plant (see Plate 5) collects in Pond No. 1 located at the west end of the site. Pond No. 2 collects the major part of surface drainage throughout the center of the site. About eleven (11) acres is draining eastward and about fifteen (15) acres is draining westward into Pond No. 2

(see Plate 5).

The area which drains to Pond No. 1 and the eleven (11) acres area which drains eastward to Pond No. 2 comprise the limits of areas considered to be potentially contaminated.

The balance of the area is generally free from contaminants and is collected in Pond No. 2 and Pond No. 3. A small amount of drainage discharge in existing swales and draining off to open streams.

4.1.6 Surface Water Runoff Quantities

Design parameters for estimating surface runoff is determined by selecting a rainfall event and calculating the Design Flow for the contaminated area. The rate is established by calculating the surface area times the rainfall in inches per hour.

The rainfall event selected will impact on the total quantity of runoff. The amount of rainfall expected every two years for the Canton area is 1.2 inches per hour, which equates to 10,000 gallons per minute (gpm) entering Pond No. 1 and Pond No. 2. A five year rainfall criteria would produce approximately 12,000 gpm and a ten year rainfall would generate 16,000 gpm.

Approximately the east half of the plant site is free from oil contamination and can drain directly into existing surface drainage system. A runoff rate for this area was therefore not estimated.

Should Canton Drop Forge be considering some type of storm water treatment in the future, a design option for treating first flush of all storm water through an oil-water separator and bypassing the excess flow into Pond No. 2. This would reduce the rate

of runoff considerably and favor a design criteria for sizing an underground oil/water separator at a significant economical savings.

Pond No. 2 currently has a existing twenty four hour surface water oil collection system that remove oils mechanically. This system would still provide the opportunity to remove floating oils when storm bypass or excessive rainfall events would occur.

4.2 Steam/Oil Separation System

4.2.1 Existing Steam System

A total of 120,000 pounds of steam per hour is generated at this facility to drive forging hammers, and the majority of the spent steam is discharged into the atmosphere. Oil is atomized into the steam prior to the forging hammer operation and should be removed as condensate before the steam is spent to the atmosphere. Oily condensate is currently discharged to Ponds No.1 and 2.

Steam is generated in Boiler House Building E which also houses the Hot Process Softener. The steam is piped to the thirteen (13) forging hammers located in Forge Shop Building C. The majority of the steam is discharged to the atmosphere at the northeast corner of Forge Shop Building C with a small amount piped to the Hot Process Softener and then discharged to the atmosphere at the southeast corner of Boiler House Building E. Another small portion of the low pressure steam is used for heating the Anvils. The condensate ^{FROM THE ANVILS} is drained to a sump in the Boiler House and pumped to Pond No. 2.

The current steam generation, usage, and discharge system consists of the following:

- Water from two wells (Well No. 1 and Well No. 2) located on the owner's

property is pumped to an elevated water tank for storage.

- From the elevated water tank, water flows to the Hot Process Softener, and the water is partially softened for use as boiler feed water.
- The heated/processed water from the Hot Process Softener is pumped by ^{ONE OF} two booster pumps into any one of three boilers. ^{ONE TO THREE} Two boilers will operate at any one time.
- The steam generated is at a pressure of 150 psig and a temperature of 366 °F (assumed saturated steam) is referred to as "High Pressure Steam," and is piped to a 14-inch manifold in Forge Shop Building C.
- A portion of the high pressure steam is used for steam heating of the buildings, but the majority of the steam is distributed to thirteen (13) forging hammers in which ~~any one to five of the forging hammers may operate at any one time,~~ depending on scheduling. A lubricant oil is atomized into the steam lines prior to the steam entering the press valving.
- The steam leaving the forging hammers is collected into a 16-inch diameter steam/condensate manifold and is ^{MAINTAINED AT} reduced to between 6 to 8 psig and referred to as "Low Pressure Steam."
- The majority of the low pressure steam passes through a horizontal oil separator drum approximately 4½ ft diameter by approximately 12 ft long, and is discharged vertically into the atmosphere. The oil/condensate mixture that separates from the steam drains to Pond No. 1.
- Low pressure steam is piped back to Boiler House Building E, to the southeast

corner, to the Hot Process Softener. After this process, the steam is exhausted to the atmosphere, and the oily condensate drains to a manhole which drains to Pond No. 2.

- Low pressure steam is used for heating the Anvils at the forging hammers to prevent shock and breakage. The oily condensate is collected and drains to a sump well in the basement of the Boiler House and is pumped to Pond No. 2.

4.2.2 Scope Of Steam/Oil Separation - Improvement

This section includes a review of available steam/oil separation systems, and provides recommendations for equipment selection to meet different degrees of treatment (% removals). Equipment and suppliers leads were contacted to provide the most up-to-date technology and concepts to solve the problem of oil that is entrapped in steam being discharged to the atmosphere. ~~Manufacturers of this equipment considered included~~ Anderson Separator Company, Pennsylvania Separator Corp. and Otto H. York Company.

The most effective method of removing large liquid particles from air/steam is to use a cyclone type system, which slows down the velocity of the median, causing larger particles to be flung out and/or dropped out. Either horizontal or vertical positions will be equally effective for liquids. Acceptable cyclone separators for this service/application are manufactured by Pennsylvania Separator Corp. and Anderson Separator. The degree of internal baffling and specific designs, however, will result in different capabilities for oil removal. The simpler designs are rated for 90 % removal, and the more complex in the 95-98 % range.

The most effective method of removing small liquid particles from air/steam is to use a fine grill/fin or cloth arrangement. Due to the high temperatures, a cotton/polyester fabric would not be acceptable. The finer mesh of this type system makes it more susceptible to clogging however. Acceptable separators for this service/application are manufactured by Otto York Mist Eliminator and Pennsylvania Separator Corp. Penn Mist Separator. These units are capable of removing up to 99 % of the oil particles.

4.2.3 Steam/Oil Separation Options

Currently the main steam is treated in an un-identified horizontal separator prior to being discharged to the atmosphere. In discussions with a manufacturers representative for Pennsylvania Separator Corp., it is assumed that the existing separator has simple baffling and may remove 50-75 % of the oil in the steam.

In reviewing the physical facilities, it was established that at the north end of the Forge Building (inside the building), there was an "Anvil" stand (no hammer) which could serve as a foundation for a steam separator. This is the basis for all "steam/oil separator" alternatives (identified with word "pier" in cost summaries) included in this study and reflected in the total costs. The alternative of mounting the new separator on the wall similar to the existing unit may be attractive and should be reviewed prior to proceeding with construction.

Several options were reviewed:

BASE: Add new horizontal cyclone separator with 90 % removal efficiency downstream of the existing separator. Leave existing separator in place. Use existing

No

"Anvil" stand (or "pier") for support and route 16-inch pipe header from existing separator to the new separator with discharge routed back to existing discharge piping/stack.

OPTION A1: Replace existing oil/steam separator with a new horizontal cyclone separator with 90 % removal efficiency.

OPTION A2: Add new upgraded (relative to OPTION A1) vertical separator with 98 % removal efficiency downstream of the existing separator. Otherwise equal to BASE option.

OPTION A3: Add new mist eliminator (upgrade further relative to OPTION A2) with 99 % removal efficiency downstream of the existing separator. Otherwise equal to BASE option.

5.0 COST ESTIMATES

Construction cost estimates are presented in the construction cost summary sheets. These costs include material and labor, overhead and contractor profit as well as engineering and design fees. Local and state taxes are not included nor is the cost of a bond and permitting fees.

The costs presented below represents the total costs for oil/water separators and the steam/oil separator, i.e., the sum of the options for both types of separator discussed separately above. Costs were developed for the following options:

OPTIONS/CONSTRUCTION COSTS

BASE:

Add new 90 percent efficient horizontal cyclone steam/oil separator.
Install single "yard" oil/water separator, and install single oil/water separator in area of main steam separator.

OPTION A1:

Replace existing steam/oil separator with a new 90 % efficient steam/oil separator. Install oil/water separators as in BASE.

OPTION A2:

Add new 98 % efficient vertical steam/oil separator. Install oil/water separators as in BASE.

OPTION A3:

Add new 99 % efficient mist eliminator steam/oil separator.
Install oil/water separators as in BASE.

OPTION B1:

Add new 90 % efficient horizontal cyclone steam/oil separator.
Install single "yard" oil/water separator, and two additional oil/water separators; one near the main steam/oil separator and one in the basement of the Boiler House.

Since the actual "high pressure steam" rate is not known, an alternative estimate was made for the BASE for a steam/oil separator rated at about one half of the steam discharge rate (approx. 50,000 lbs/hr). Overall construction costs were estimated to be

lower by about [REDACTED]

6.0 CONCLUSIONS AND RECOMMENDATIONS

The lowest cost option, using the bases given in this study, is OPTION B1. By using a combination of the optional costs, however, the absolute lowest cost would be [REDACTED]. In this case, the existing separator is replaced with a 90 % efficient horizontal steam separator rated for 50,000 lbs/hr and three oil/water separators.

For the relatively small difference in total costs [REDACTED] FBA recommends that the new steam/oil separator be capable of handling the maximum steam rate (120,000 lbs/hr) which brings the total cost to [REDACTED]. It is further recommended that the existing separator is left in place to serve as a pre-treatment separator, which brings the total cost to [REDACTED]. Finally, it is recommended that for the difference in cost of [REDACTED] that Canton Drop Forge consider upgrading the steam/oil separator from the 90 % unit to the 98 % efficiency unit which brings the total cost to [REDACTED].

No work was performed in respect to recommendations for closure of Pond No. 1, since this is handled separately by Canton Drop Forge.

Plates No. 3 and 5 reflect the survey work.